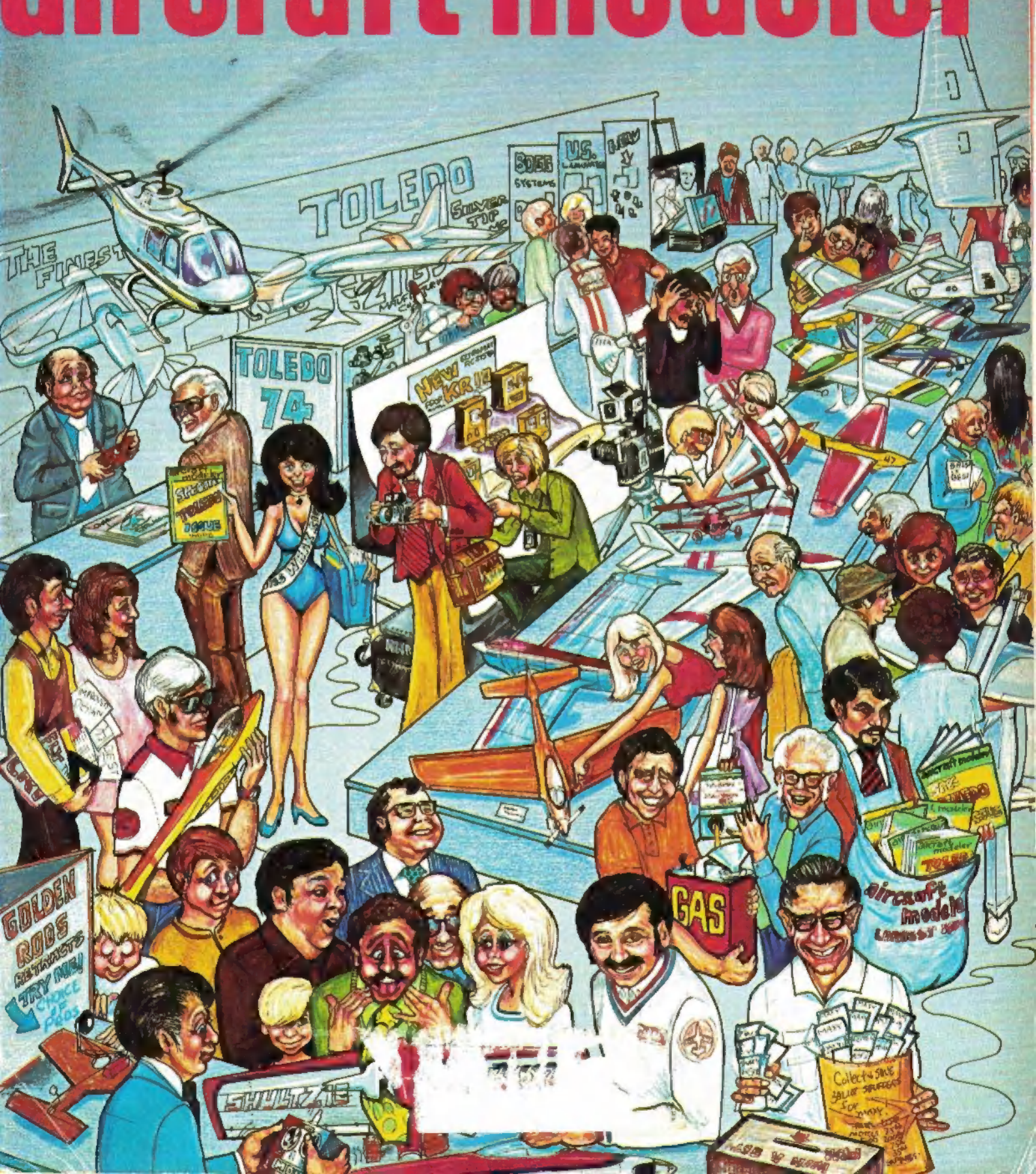


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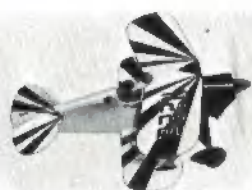
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AMERICAN aircraft modeler

VOLUME 78 NUMBER 5

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FOR .60 ENGINES



Paul Harvey Views

Valdosta, Georgia, is as far south as you can get without being in Florida. I went there last January to preview springtime.

The city was in bloom: azaleas and camellias amidst green pines and palms...

Great live oaks were draped with spun platinum Spanish moss.

It was the middle of winter and Valdosta Aero Club members were out flying in shirt sleeves.

Modelers are the same everywhere; modeling is not.

J.C. Johnson, an Aero club member who is a popular local broadcaster, brings his birds to the field on weekends aboard a luxurious "land yacht" which he parks alongside the pit area for the refreshment and convenience of other members.

(Continued on page 105)

Paul Harvey explains the details of his seaplane to fellow news broadcaster J.C. Johnson, of Valdosta, Georgia. In the background is Mr. Johnson's "land yacht," which he brings to the local flying field as a convenience center for fellow club members.



Modeler Mail

Calkins Ad Nauseum

The editors of AAM thank all of you who promptly responded to "Some Practical Advice," which appeared in our February issue. We find this sort of feedback very gratifying.

Due to the tremendous response Mr. Calkins' letter generated, it is impossible to print all reactions. The cross section of letters (which appeared last month) reflects the varied replies. Some were well articulated and informative, while others were erroneous, and often humorous. Is this an indication that the controversy still rages on? Perhaps. In the meantime, we rest our case.

—Editor

A Word Of Thanks

I want to take this opportunity to thank you for the cover page of the February '74 issue, which shows Thomas Koster and his F.A.I. power ships.

We free flighters are a diminishing breed of fliers, and we appreciate any recognition we can get.

Many thanks for this, as Thomas Koster flew with our club (the M.M.M. Club of Denver, Colorado) for a month, when he visited this country.

Bill Baldridge
Denver, Colo.

EI Super Cheapo

Your article, "Model Techniques," in the January issue, really appealed to me. I immediately built an EI Cheapo Peanut Proportional Divider. At the time, I was building a 1/2A version of Al Rabe's Mustunt II.

The Mustunt II has a 48-in. wingspan; my version was 20 in. No setting on my Divider would work, and so, I was back to the calculation method. It takes a while, but the light finally dawned. A pair of simultaneous equations would give the proper place to drill another ratio hole.

We know the overall length is nine in.

Therefore: $x + y = 9$

We then have the drawing dimension on the February issue of Mustunt II. Half of the wingspan measures six in., which gives us the following ratio:

$$(2) \frac{6}{10} = \frac{x}{y}$$

From algebra:

$$(3) x = \frac{6}{10} = 0.6y$$

Substitute into (1)

$$0.6y + y = 9$$

$$1.6y = 9$$

$$y = \frac{9}{1.6} = 5.63 \approx 5\text{--}5/8"$$

$$x = 9 - y = 9 - 5\text{--}5/8 = 3\text{--}3/8"$$

I drilled a new hole, and I am using the Dividers. The above should work with any ratio and any length divider.

E.D. Anderson
Boulder, Colo.

Thank you for sharing your "discovery" with us. But, why bother with all the calculations, when you can simplify matters by taking advantage of AAM's Sudden Service Plans?

—Editor

Learn First, Crash Later

Just thought I'd say a few things to beginners. First of all, I'm a beginner, I'm 15, and was a little over anxious.

First time out at our flying field, I couldn't get my OS 35 to stay running, because I had the tank too low in the new Falcon 56. Second time out, it got off the ground, but kept stalling. Third time out, after shimmying up the LE of the stab, I knew it had to get up. Needless to say, I was very discouraged when there were no other fliers out, except for one kid who had only been flying one summer. Well, being sick from a case of overconfidence, I decided to take it up all by my own inexperienced lonesome. After doing a few good imitations of a wounded duck, it came down in some tall weeds, and the stab was demolished. All else was still in good shape. That was the first time I realized what I had done. Mainly, I oversimplified what RC flying was about.

What I'm trying to say is please don't do what I did. When you get your first plane, get an experienced flier to teach you. Don't fly your own crash course. It's not worth the discouragement.

Russ Butson
Glenwood, Ill.

Caveat Emptor

I feel it is high time that a fact is revealed to the beginner and also to many average modelers. During the past year, every model magazine with which I am familiar has mentioned the desirability of sending off an engine to an engine rework specialist if the owner doesn't understand engine work and desires optimum performance.

Here's the fact: Sending an engine to an engine specialist is no cure-all. As a

(Continued on page 100)



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Falcon 56 shown

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Model Aircraft Expo

The CL and RC boys looked into each other's backyard and found that they could cooperate in getting a great air expo together. Done without any hobby industry support, they staged a show of major size on their own.
by Bill Boss

Much has been said about how the people of various modeling categories do not always see eye to eye about the merits of the other guy's choice of activity, but here is a switch. In an effort to put a dent in this kind of thinking, the Garden State Circle Burners, a CL club, and the Rockland County Radio Control Club (both of New Jersey), teamed up to put on a mid-winter model show/competition that had for its theme the "Spirit of Cooperation." The show was a major effort to prove that RC and CL could work side by side for the common good of our modeling sport. The idea was to provide the general public with an opportunity to see, at close range, a large variety of different types of model craft. It is this kind of display that permits close examination of the work involved in producing a detailed miniature flying aircraft. This, in itself, brings us closer to dispelling the toy plane image.

There was also some consideration as to whether or not to present the Expo as a "trade" show. Soliciting booth space from manufacturers was discussed. The pros and cons of commercial involvements were carefully weighed. After all, look how Toledo had grown with the support of the hobby industry. It was the final decision that the Expo could make it on its own merits—the emphasis would be on models, not manufacturing.

The show was held on January 12 and 13, 1974, at the Marriott Motor Hotel, Garden State Parkway and Interstate 80, Saddle Brook, New Jersey, and consisted of a static display, competition, AMA aeromodeling films, as well as building and flying demonstrations.

The static competition took place in the Marriott's main ballroom which, as it turned out, was barely large enough to accommodate the 134 models entered, and the more than 1300 spectators that filed through the display area during the two-day show.

Awards for the competition were donated by local hobby shops and were given to the top three competitors in the following categories—Pattern (UC and RC), Racing (UC and RC), Old Timers, Helicopters, Gliders, Scale (WWI and Post WWI), Sport, Boats, Cars and Rockets. In addition to category awards, the Marriott Motor Hotel pre-





sented the "Best in Show" and "Best Junior" trophies.

It should be noted that, while local hobby shops supported the show with the donation of awards, no other hobby industry was solicited, as has been the usual case for shows of this type. Another major difference between the competition at this show and other exhibition/trade type shows is that in many of the competition categories, the various types of models (RC, UC and FF) competed against each other. In deference to the structure of most "trade" shows, the Expo chose to emphasize the unity of modeling, not the categories which we insiders find so important. This thinking also reinforced the Expo's theme—"Spirit of Cooperation." Here, the type of model was not the important factor, as winners were chosen mainly on the basis of craftsmanship and finish.

In addition to the main display area, three smaller conference rooms were set up, in which AMA films and model building techniques were presented every hour on the hour throughout both days of the show. The AMA films shown were *Wings and Things*, and the 1948 *Plymouth Internats*. Model covering techniques, using MonoKote and silkspan, were demonstrated by various members of the Garden State Circle Burners and Rockland County RC clubs, while Bob Hunt of Control Specialties Co. showed how to "hot wire" cut and assemble foam core wings.

(Continued on page 86)

- 1 A good spectator turnout makes any show a success. Here, a few of the more than 1300 who viewed Model Aircraft Expo '74 indulge in a bit of private scale judging at the WWI RC display.
- 2 Best in show—model of Moran Tug by Jim Seaton. Gas-fired boiler provides steam for homebuilt engine of this RC boat.
- 3 Henry Minning has a captive audience as he explains some of the working features of his RC B-24 Liberator.
- 4 Winner in the CL Speed category was George Brown's impeccably finished OPS speed ship.
- 5 Len Sabato flew his original design chopper several times to please the shivering masses who braved the cold to enjoy the flight demos. Len's hands were so cold that he could hardly feel the stick.
- 6 Josh Titus, AMA District II VP, and Co-Chairman of the Expo, presents "Best Junior" award to Stacey Efron whose Fokker D-7 was impossible to beat.
- 7 Old Time FF entry by Joe Beshar is a scaled up version of his original 1940 Fox design.
- 8 Have a six-pack! Ralph Ludwik built this CL model to satisfy his thirst for a novel creation. Many commented that the builder must have flipped his top.

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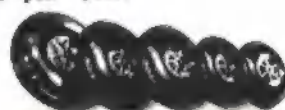
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Total list value \$46.90 **PRICE \$34.00**

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Ace RC's single channel (rudder-only) pulse proportional RC systems give reliable and enjoyable control when installed in small gliders and small, stable RC powered planes such as Ace High glider, Goldberg Jr. Falcon, Competitions Kits' Eindecker, Midwest Li'l "T", Tern Aero's Super Starduster, Sig's RC Sport, Stinson and Relic.

If you've never seen a powered plane fly on rudder-only control you'll probably be surprised when you see it ROG turn, barrel roll, loop, and glide into a spot landing. And, small gliders with these super light weight systems in them fly like trained eagles.

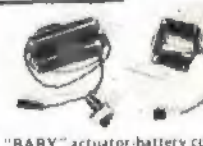
Ace R/C System	Airborne Weight for	Recommended for	List Price	Hobby Lobby Price
"BABY"	2.5 oz.	Pee Wee 020 Up to 48" gliders	\$59.95	\$53.97
"BABY TWIN"	2.7 oz.	Tee Dee 010 020 Up to 72" gliders	\$62.95	\$56.97
"STANDARD"	3.7 oz.	049 to 10	\$61.95	\$55.97
"STOMPER"	4.1 oz.	Tee Dee 049-23	\$64.95	\$58.97

All four above systems are identical except for the actuator used, and the capacity of the airborne batteries - the two lightest systems use 225 mah cells, and the two heavier systems use 500 mah cells (for longer flying time). You can inexpensively convert your system to one of the others by simply changing the inexpensive actuators and/or batteries (all components PLUG IN). Our recommendation for the most useful all-purpose systems are the "STANDARD" and "BABY".

NEW! Ace R/C Pulse Proportional ACTUATOR-BATTERY PACK**Combinations**

These convert the basic Ace Pulse transmitter and receiver to any of the 4 available types. Example: Let's say you own an Ace "Stomper" outfit for use in a fairly big 15 size plane, but you'd like a lighter, smaller "Stomper" outfit for use in a smaller plane. Just order the inexpensive actuator-battery combo that fits the size plane you want to fly.

All component combos come with connectors for "plug-in" convenience, and as inexpensive as the combos are, you can afford to have several planes permanently equipped with actuator and battery, and use one transmitter-receiver set to fly them all.

**TRY US OUT: R. S. DID.**

I would like to take this opportunity to congratulate you on your fine, fast service. After doing business, or should I say trying to do business with two (2) of your highly advertised competitors, I was about to give up trying to get RC equipment by mail, but you have sure restored my faith in the mail order way. Keep up the good work, and thanks again.

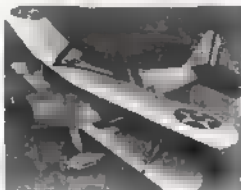
R. S., Constableville, N. Y.

COMING SOON!
"HOBIE HAWK" READY-TO-FLY GLIDER **\$129.00**



This ENTIRELY READY-TO-FLY glider should be available at Hobby Lobby about April 30. 99" span, 590 sq. in. with an unusual elliptical dihedral and some thoroughly unique construction techniques.

COMING SOON!
Sig LIBERTY SPORT Biplane
 List price \$43.95



\$39.97

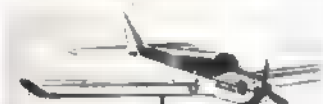
57" span exact scale RC that flies like a sport model. A really deluxe kit with formed cowling, molded wheel pants, aluminum L.G., 4 decal sheets, 3-view of prototype, illustrated instruction booklet.

SPECIAL (prices in effect until April 30, 1974)



V-K CHEROKEE **SPECIAL**
 List price \$43.95 **\$29.97**

65" span, big 754 square inch wing area for .40-.61 engines, 4 channels.



V-K BABY CHEROKEE **SPECIAL**
 List price \$28.95 **\$18.97**

53" span for .23-.40 engines.



V-K CORBEN SUPER ACE **SPECIAL**
 List price \$34.95 **\$23.97**

56" scale model of 1930's classic. For .35-.46 engine.

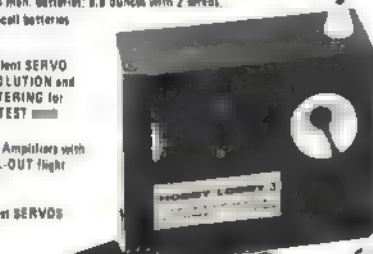
Here's Hobby Lobby's New 3 Channel Radio. Add up what its features are worth, then see if you believe the price!

★ **ULTRA-LIGHT** airborne WEIGHT 6.5 ounces with 2 servos, and 225 mah. battery: 8.8 ounces with 2 servos, and pencil battery

★ **Excellent SERVO RESOLUTION** and **CENTERING** for **CONTEST**

★ **I. C. Servo Amplifiers** with **ONE-CELL-OUT** flight capability

★ **Smallest SERVOS** made



★ **A COMPLETE**, ready-to-operate outfit. 3 channel Transmitter, 1 channel Receiver, 2 Servos, Airborne battery, 6 switch

★ **Some REACHING** Transmitter power as the Hobby Lobby 5

★ **Receive 2 and Control**

★ **Same selective** and sensitive Receiver circuitry as the Hobby Lobby 5

★ **PRICE** About HALF of what you'd expect to pay for 4 top quality, 3 Channel radios.

The Hobby Lobby 3 is a ready-to-operate 3 Channel Digital Proportional outfit, consisting of a 3 Channel Transmitter, 1 Channel Receiver, 2 Servos and airborne battery, holder and switch.

The Hobby Lobby 3 is manufactured for Hobby Lobby by the same company that makes the ultra-reliable Hobby Lobby 5 Proportional system. Many of the same components, both systems. The servo, H.L. 3 uses the same selective as the H.L. 5 Series III 4th Channel servo, and the optional airborne nickel-cadmium battery packs are interchangeable between both systems.

With its optional 225 mah. nickel-cadmium airborne battery pack, the Hobby Lobby 3 is one of the true ultra-lightweight systems.

The previous Hobby Lobby 3 radios used the 3 channel servo, thus, the ultra-lightweight and the proven reliability of the Hobby Lobby 3 system. The Hobby Lobby 3 Channel system also offers the same selective as the Hobby Lobby 5.

HOBIE LOBBY 3 **\$89.00**
3 Channel (27 mhz, 3 servos)
Digital Proportional **\$99** (172 mhz, 2 servos)

Series III

HOBIE LOBBY 5

Digital Proportional

We're afraid to change it!

■ **Unsurpassed** reliability

■ **Extremely** Long Range

■ **Smallest,** Lightest, Servos made

■ **Extra servos** cost only \$13.00

■ **Full 90 day** Warranty backed by the manufacturer and by Hobby Lobby

■ **A Complete system;** Transmitter, Receiver, 4 servos, all n-cads, charger, 27 or 72 mhz

■ **I. C. FULL-POWER** servo amplifiers

Series III

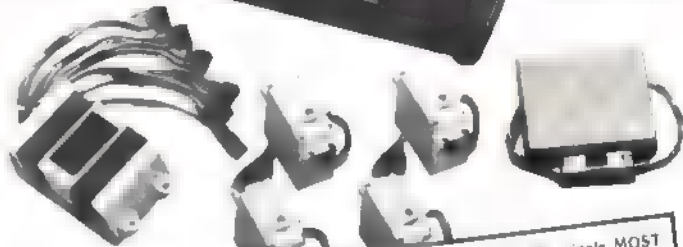
HOBIE LOBBY 5
Digital Proportional

\$209

■ **Reliable Airborne** battery pack with **ONE-CELL-OUT** flight ability



■ **Only** 11 1/2 oz. airborne weight



OUR SECRET...

The Hobby Lobby 5 has one particular feature that makes it the single MOST RELIABLE digital proportional in our experience (and we stock most brands of digital, so we figure we've got a pretty good basis for comparison). This feature is that the SERVO amplifiers are housed inside the RECEIVER in the Hobby Lobby 5, instead of inside the servos themselves. As the servos are the only components (besides the switch) that are tightly fastened to the vibrating airframe they are subject to vibration-induced breakage in every single solder joint. All other brands of radios have as many as 80 solder joints inside EACH SERVO. But the servos for the Hobby Lobby 5 have only 8 internal solder joints. The other solder joints for the servo amplifier are inside the more shock-protected receiver.

Knowing of the high reliability of the Hobby Lobby 5 servo system we can't understand why EVERY digital proportional doesn't use this obviously better servo amplifier idea. But, as it stands now, the only radio system we know of that uses this sensible system is the Hobby Lobby 5.

P. S. This servo amplifier system has another nice fringe benefit. Since it contains no expensive amplifier, a Hobby Lobby 5 servo only costs you \$13.00.

"Innards" of a H.L. 5 servo

NEW! DAE POWER PANEL **HOBIE LOBBY PRICE \$15.97**
 List price \$18.95



This 3"x 5" panel mounts on your field box and connects to a 12 volt battery to give you:

- A. 12 volt outlet to electric starter,
- B. 6 or 12 volts electric fuel pump,
- C. 1 1/2 volts to glow plug,
- D. Ammeter to check condition of glow plug,
- E. Connectors, leads.

BRAND NEW! VOLUME III
HOBIE LOBBY ILLUSTRATED CATALOG **\$2.00**

MORE goodies, **MORE** photos, **MORE** of the **LOWEST DELIVERED** prices in the R/C Hobby!



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Uplift

PR IN ACTION: RENO RC CLUB HITS THE SHOW CIRCUIT. / by Tom White

The Reno Radio Control Club, Inc., which consists of 50 members, has the idea that, since we enjoy the hobby so much, more people should also enjoy it. For the past four years they have been trying to elevate the image of the RCer from that of a big boy playing with toys, to one of the sport-hobbyist who has as much fun ■ a golfer ■ hunter, and who can also add something to the community.

They are a non-profit corporation in the State of Nevada, as well as an AMA chartered club. They have, as well as the usual club activities each year, two contests, an auction, a dinner with the wives and a family picnic.

This organization also publicly promotes the hobby. When they first felt

the need for public relations in their club, they had only 15 or 20 members, and a few newcomers from the CL ranks.

Their start in PR was a display of the models arranged through the area's largest shopping center. This was followed, the next day, by a flying demonstration at the club field. This display, coupled with flying demonstrations at the end of the Reno National Air Races, encouraged them to continue their PR efforts. They have had three annual displays since then and have flown at three of the Air Races' cross country dashes.

For the past two years, they have been able to display models and fly on air race weekend, primarily as crowd en-

tertainment during the morning wait before the races.

In 1971, they entered a float in the Air Race Parade in Reno. During the parade and the flight demonstrations, the crowd gave them good support, and the club began to grow with newcomers and reactivated Ukie fliers.

These events, plus good coverage in the newspapers, helped them put RC modeling before the public. They were later featured on three different TV programs by the local stations.

Their biggest chance to really add to the community came when they were invited to give a lecture and demonstration to a sixth grade class. One of the club members was able to get time off from work to present a one-hour program in the classroom. They have offered this program to several other schools and will probably have the opportunity to participate further in this way.

Since they, as a club, have a permanent PR man and a special events director, things keep alive and active in the Reno area.



ABOVE: A good display was set ■ in the area's largest shopping center. This is an annual event for the club in conjunction with the Reno Air Races. RIGHT: The crowds were great throughout the entire Reno show. Notice the excellent barrier around the models and two members of the Navy Blue Angels. BELOW: Three members of the Reno Radio Control Club in front of "Miss Candace." It's great when you can hook up with full-size planes for a show.



Photos by Author

In 1974, EK-logictrol is celebrating a decade of leadership in the field of R/C flying. This is EK's year.

Over the past 10 years, EK-logictrol has introduced a variety of outstanding innovations to R/C flying.

It's earned an unsurpassed reputation for engineering quality, service and reliability.

And this year, in celebration of the completion of its first decade, EK is once again featuring a host of significant new improvements. Here are just a few of the highlights of EK's year:

- A new 3-channel LRB with I/C servo amplifiers providing greater control accuracy and faster servo response, priced from \$139.95.

- A new 4-channel LRB with brick receiver/servo package, I/C servo amplifiers, N-Mod receiver pack, and built-in voltmeter and single- or dual-stick control, priced from \$199.95.

- A new 5-channel Champion with dual-stick control, throttle right or left, priced at \$319.95.

- A new 7-channel Super-Pro with single- or dual-conversion receivers, priced from \$379.95.

- A new expanded-scale voltmeter, a light-emitting diode on battery charge circuit and a two I/C receiver decoder circuit, standard on all 1974 Champion and Super-Pro units.

- EK's precision control sticks with adjustable tension, as in the past standard on all units, and EK's popular Mini-Mite (miniature rotary) and Super-Mini (rotary) servos. The Super-Mini is the world's smallest servo.

- EK's exclusive, renewable warranty on all Champion and Super-Pro units and its 90-day warranty on all LRB units.

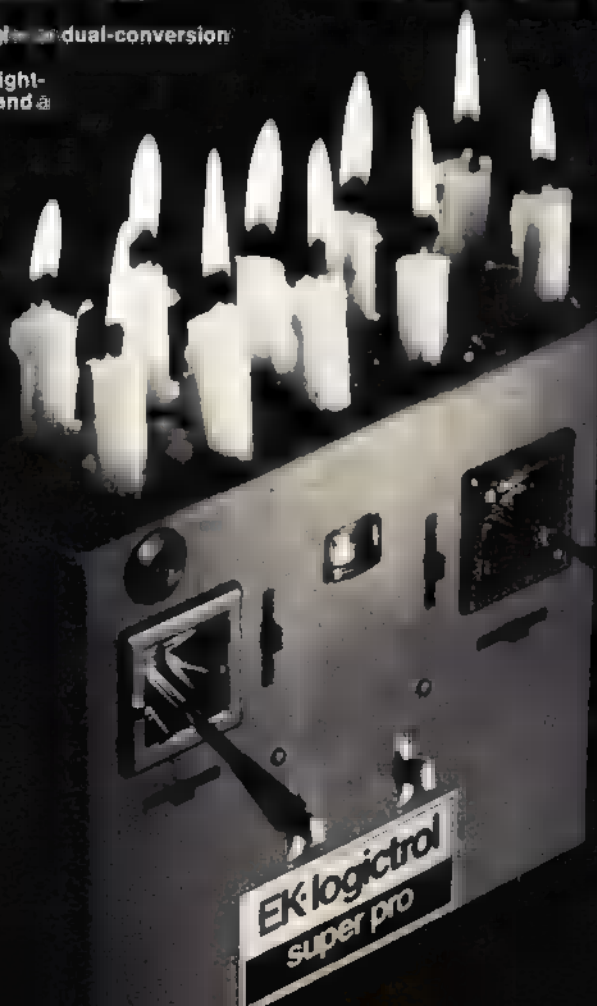
In 1974, EK-logictrol is putting improved control, precision and reliability into the hands of the R/C flyer.

It's EK's year. And it could be yours, too.

Celebrate with EK. Take the controlled approach to R/C flying.

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The controlled approach



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DIGITAL COMMANDER

The Digital Commander is a series of kits which are designed to be compatible with any modern existing system and offer expansion or replacement within the system without the need to buy a complete outfit.



SERVO

An IC servo amplifier and the popular D & R servo mechanics combine to make a servo that gives superior resolution and rapid transit time. It operates with 3 or 4 wire IC decoders with positive pulse output.

Available in Bantam (rotary output) which measures 1 1/2 x 1 7/16 x 3/4 in. or Linear (linear and rotary output) measuring 1 13/16 x 1 7/16 x 7/8 in.

14G20 BANTAM SERVO KIT \$21.95
 14G20L LINEAR SERVO KIT \$22.95

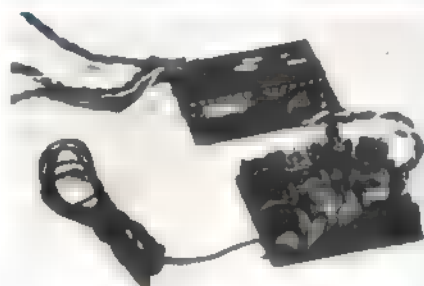
QUAN	CAT. NO.	ITEM	PRICE	TOTAL
1		CATALOG	\$1.00	\$1.00

ADD \$1.00 for handling on all orders except catalog.

1-8 RECEIVER

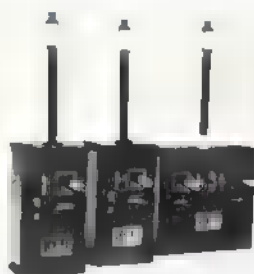
This receiver features voltage regulated circuitry with AGC and double tuned front end. An 8 bit shift register in the IC decoder offers 8 to eight channel operation of positive or negative pulse with 3 or 4 wires.

Plastic case measures 1.45 x 1.72 in. Weight is 1.4 oz. Connectors are not furnished. Specify frequency.



12G18 1-8 RECEIVER/DECODER KIT \$34.95

TRANSMITTER



Our high output RF section and IC encoder is housed in an attractive vinyl aluminum case with the popular Rand/Ace control stick which provides smooth, accurate control and trim functions.

Case dimensions are 6 3/4 x 1 1/2 x 2 3/8 in. Kit is complete except for battery.

Conversion packages to expand to three or four functions are available.

11G20 2 Ch. TRANSMITTER KIT \$39.95

FLITE PAK PRICES

Switch and connectors are furnished in the flite paks plus a money saving price!

12G18-2	1-8 FLITE PAK w/2 BANTAM SERVOS	\$74.95
12G18-4	1-8 FLITE PAK w/4 BANTAM SERVOS	\$114.95
12G18-2L	1-8 FLITE PAK w/2 LINEAR SERVOS	\$76.95
12G18-4L	1-8 FLITE PAK w/4 LINEAR SERVOS	\$116.95

The above are available on: 26.995, 27.045, 27.095, 27.145, 27.195, 53.1, 53.2, 53.3, 53.4, 53.5.



NEW!

BUILDERS TRIANGLES

These come in handy for various uses in the workshop. Perfect for insuring squareness of fuselage sides, bulkheads, firewalls, etc. Because they are aluminum, they are great for a cutting straightedge. The small size will fit down in between formers and other hard to get at places.

Both sizes, one 6" high and the other 2 5/8" high, are 30-60-90 degree aluminum triangles. A pair of each size come in the pack.

No. 31L23-BTR Builders Triangles Set of four \$1.50

TOPCOTE

Ace R/C has now taken over the manufacture of TOPCOTE, formerly made by Quick-N-Easy Products.

TOPCOTE is a clear, tacky backed, mylar covering material that readily accepts dopes and paints. It requires low heat and is tacky so it is ideal for covering molded foam. Also works great over open framework and solid structures. Because it is paintable, there is no need for stock piling numerous colors.

Another time and work saving for TOPCOTE is as a patching material. If a square of it is painted at the same time as the rest of a conventionally finished airplane, you have a quick patch which matches the color exactly and eliminates the need for surface preparation of the damaged area when the inevitable ding occurs.

There are many more uses for TOPCOTE around the workshop. Get a roll and start experimenting. We'd appreciate hearing the results.

No. 24L180-Clear TOPCOTE 27 x 60" \$3.95
 No. 24L162-Clear TOPCOTE 27 x 120" 7.50

SUNDAY FLYER WINGS

Because of the demand, we are packaging the wings needed to build Ken Willard's Sunday Flyer series featured in A.A.M. These designs include the Sunday Glider and the Sunday Fighters.

Package includes four constant chord panels cut at the angle needed for 3 1/2" dihedral.

No. 13L65-Sunday Flyer Wings \$6.50

Yours sincerely,

 Paul F. Runge

USE THE COUPON ABOVE TO GET OUR COMPLETE HANDBOOK/CATALOG

MAYBE THE TIME HAS COME.

With the shortage and expense of gasoline needed to get to the large flying fields and the soaring cost of model fuel, maybe the time has come for you to move to a smaller airplane....one that can be flown in the local schoolyard and carried there in a Volkswagen—one that gets about ten times the flight time per ounce of fuel

than your .60 powered beast—one that you can hand launch and not need a long, manicured runway—and one that can offer you as much enjoyment and excitement as your present gas gulper.

Below are two of the best .049 class airplane kits which excel in performance, quality, and appearance. From the small airplane experts, Ace R/C, Inc.

Whizard

DESIGNED BY OWEN KAMPEN



SPECIFICATIONS

Span--40 1/2 in.

Area--240 sq. in.

Length--30 in.

Power--.049 to .051.

Functions--Rudder-Only;

Rudder-Elevator; Rudder-Elevator-Throttle.

An ideal sport airplane for .049-.051 engines and single, two, or three channels. Features sturdy crutch fuselage construction, foam wing, hand sawed parts, formed landing gear, and photo illustrated instructions.

Because the financial and emotional investment is low in the Whizard, you will find yourself doing more gutsy things flying this airplane and enjoying it more than ever before. Fun is the major characteristic of the Whizard.

13L105 WHIZARD KIT \$17.95

WAR BIRD

DESIGNED BY ROMEO BUKOLT



The Warbird is an exciting approach to small plane appearance and performance. With one kit you can build either a P-51B, a ME-109, or a Hawker Hurricane. Because of the configuration of the kit, you can even be creative and design your own Warbird.

Performance is not sacrificed for the realistic appearance of this airplane. Using a TeeDee .049 or .051 with ailerons and elevator control the Warbird is a fast, groovy, responsive ship with excellent axial roll and inverted flight characteristics. Because of its clean lines, it penetrates well and the power-off glide is outstanding.

It builds quickly, looks great, performs beautifully, and is cheap to operate. What more do you need?

SPECIFICATIONS

Span--42 in.

Area--225 sq. in.

Length--29 in.

Power--.049 to .051.

Functions--Rudder-Only;

Rudder-Elevator; Ailerons-Elevator.

13L210 WARBIIRD KIT \$17.95

ACE R/C INC.



TOLEDO

Unconventional Convention

A crowd is not company, and faces
are but a gallery of pictures, and talk but a tinkling
cymbal. . . / by Patrick H. Potega

Toledo is a trade show—a festival of hawkers and vendors, salesmen and inventors. Artists unveil their creations; artisans perform mechanical and electrical wonders. Modelmongers negotiate, bargain, deal and dicker with total strangers. A bazaar atmosphere of ballyhoo prevails. The shuffle of frantic feet around a huckster's stand—here is the marketplace where men and merchandise meet.

But, to look deeper, there is the energetic exhaustion, the hysterical and chaotic serenity, the loneliness of the crowd. After 48 hours of this ordeal, the noise of the convention dissolves into something unconventional—the siren song of our hobby and the images of modeling.

The siren song had a few dissonant notes this year. Murmurs of material shortages, inflationary price trends, and conservative approaches in technology and manufacturing hummed from booth to booth. An unpretentious poster announced that the Weak Signals Club had arranged with a local station for Sunday gasoline. Even this mecca of modeldom couldn't totally divorce itself from the outside world.

Everywhere, the beat of the drummer was a crescendo of success and optimism. For example, the age of the ducted fan (which AAM prophetically predicted in its Toledo coverage of last year) arrived with a trumpet-like fanfare. Looking about, the eye was assaulted by our art forms. Images of helicopters, gliders, and revolutionary engines came like bold brush strokes from a creative palette. Kits—

Photo by Bill Coons



Photo by Bill Coons



Photos by Kelly Matthews, except as noted

In a ■ of upturned faces. . . and with his wife, Jack Perry is the winner. His Dazler (a super-beautified Mach 1) brought him not only the Best Finish trophy, but also the Best-of-Show.



stand-off scale, racers, trainers, pattern and scale—were like portraits on a giant canvas, boldly reaffirming the progress of our hobby.

The noise was slightly less intense, and the colors muted on the ice-covered flying field. Here, the eye became a lens for a movie of more graceful action. A helicopter whirlybirds ■ intricate aerial dance. A stand-off scale Phantom slices the February air like a razor-sharp pattern ship. An ARF glider soars and stunts in slow motion. Colonel Betkey's Flying Circus, a fifteen-man precision flying team, presents frame after frame of the best executed demonstration flying ever seen (the team was so good, that AAM will do a feature on it in ■ future issue). One returns from the flying area cold of body, but warm of

heart, as the rhythms of flight settle into the memory.

The bargain hunters head for the swap shop—a mini-trade show with a surrealistic flavor all its own. Others, the craftsmen and artisans who have come to compete in static display, join the throng around the awards dais. The glint of a trophy flashes, as the honor roll of winners is called. Frenzied applause echoes, as it is officially announced that the 1975 Toledo Conference will be held in the expanded facilities of the Toledo Sports Arena.

But all of these are individual entities and happenings. In the rush and roar, the merry-go-round of people gawking, gyrating, gaping and grabbing explodes into a kaleidoscopic myriad of impressions and images. Instant food

and bleary eyes turn it all into a mesmeric numbness of exquisite pain.

Then, just as suddenly. . . it's over.

When the 6500 people who attended this convention get off the merry-go-round, they depart with empty hands. Yet, unknowingly, they have captured the brass ring. Haven't each of them taken something more than what they came with? Maybe it was a new friend, a new idea, a breath of mid-winter inspiration to rekindle an enthusiasm for the hobby. Who could walk away from it all without that "someday, I'm going to" feeling? Everyone leaves Toledo with a sense of satisfaction and accomplishment. However, it is the siren song which lasts; it is the images which persevere. These are what make Toledo an unconventional convention.



A high-contrast, black and white photograph of a mechanical component, likely a valve or actuator. The component has a large, ribbed cylindrical top section, possibly a handle or a protective cap. Below this, the main body is complex, with several ports and a handle-like structure on the left side. The image is grainy and has a high-contrast, almost solarized appearance.

gasket to prevent blow by on the adjustable side of the needle which is sometimes encountered when you are running on pressure. Production engines will reach the United States in quantity in 1974. OS can and will meet the 1000 engine rule in the year of '74.

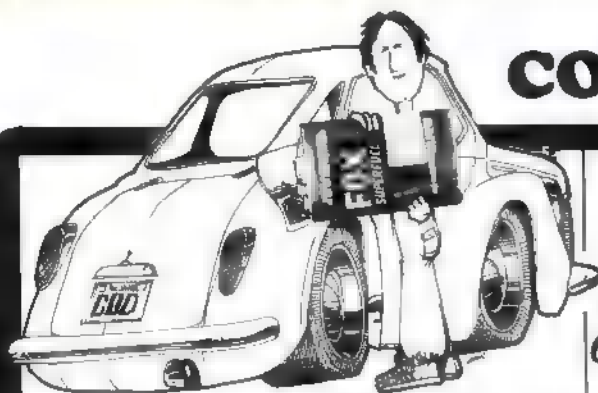


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Micro-sanded balsa! Full size plans builds in a few evenings.

SPAN: 43"
AREA: 290 Sq.
ENGINE: .049-.10-.15
RADIO: 1 TO 3 CHANNELS

Only **\$13.99**

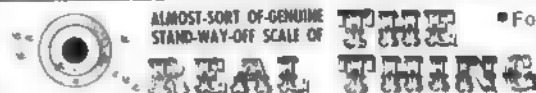


New

ACROMASTER

21 to .40 engines
Only **\$32.99**

A new improved version of our earlier production kit, now with more hardware and better plans & instructions. We believe that we have made a good kit even better. Recommended as a first "low-winger", for a full 4 channel system and engines from .21 to .40 displacement ratings. The wings are pre-formed cores (instruction on "skinning" included) at 54" in span. Scale shaped molded canopy and aluminum landing gear included in hardware.



If you're not flying the Real Thing, you must be flying something else.

54" WING SPAN 319 Sq.-" AREA
.049-.10 ENGINE 2 TO 3 CHANNELS

For REAL Fun!!!

Self-jigging construction

Die-cut balsa and hardwood

Quick & easy assembly

Only **\$11.99**
EACH

The Hobby Shack HEAT GUN

Why Pay More?

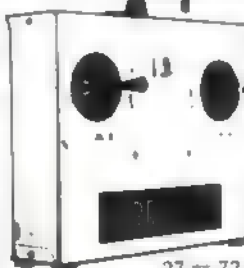
This is the heat gun that does everything that it supposed to do and more! Many are in the hands of modelers today, and we have many letter of appreciation.

Only **\$14.99**



Super Sport 4

Radio Control



4 channel trans and receiver, 2 sticks and 4 servos and Ni-Cad rechargeable airborne pack. 90 day warranty.

Only **\$189.00**

27 MHz.

SPORT III

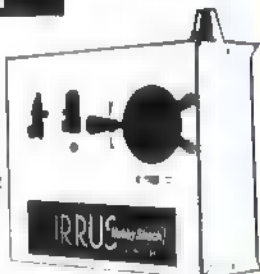
CIRRUS

Single stick 3 channel system w/ 2 servos all dry system.

\$1000 more on 72mhz

Only **\$89.99**

Sport III system w/ 3rd servo . . . \$115.00



Airtronics OLYMPIC

Hi Performance Sail Plane*

99" wing span
RETAIL PRICE \$44.95

Sale **\$33.00**

BRIDI .40 New KAOS

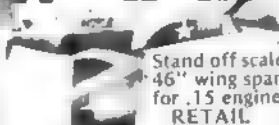


New .40 from Joe Bridi Ent.
RETAIL \$44.95

Sale **\$33.00**

SureFLITE

P39

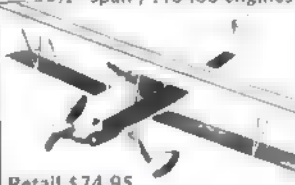


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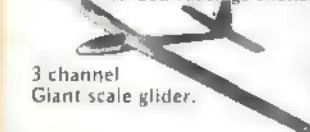


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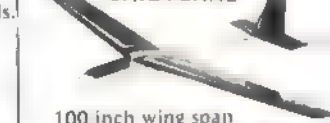


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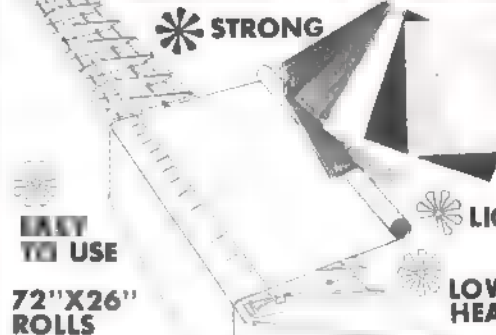
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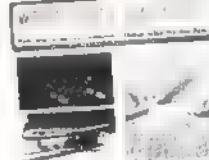
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Product Progress

AT TOLEDO. / by Eric W. Meyers, AAM Product Editor

The show floor was packed with people, booths and airplanes from corner to corner. An atmosphere of enthusiasm prevailed. The excitement was there. Modelers were finding the "super widgets" that they just couldn't do without. Manufacturers were ecstatic to see their efforts so well received.

Compared with last year, there was a significant increase in the number of manufacturers, though there were fewer modelers. The elbow-to-elbow experience of years past subsided to a welcome arm-length to arm-length situation this year. This can undeniably be attributed to the difficulty in procuring gasoline.

There can be little doubt that this show was a great indicator that the energy crunch is really here. Whether or not this is true in the real world... who's to say? The fact remains that while three fourths of the manufacturers displayed new products, the general consensus of opinion was one of "Wait until '75." It appears that, for various reasons, many manufacturers are holding off production of that extra-special gadget which would send us all rushing to our local hobby shop until they are able to produce enough to meet demand.

Supply problems are the biggest puzzle manufacturers are trying to solve. Because our industry orders raw materials in lots of thousands instead of

millions, the major industrial suppliers are considering our priorities as secondary. Detroit has bought up most of the IC's, causing major problems for radio manufacturers. Thus there were few significant radio changes this year.

One major engine producer says that he is in much the same situation: he faces the problem of a 42-week wait for ball bearings and a 28-week wait for casting aluminum. Balsa, plastic, metal—it's all the same story.

However, let's look at some products which were at the show and are sure to influence our thinking.

CURRENT TRENDS

Many things are getting smaller these days—our cars, calculators and pocket books—so why not our airplanes? While an occasional 60-powered bruiser was shown, the vast majority of airplanes at Toledo were in the 40-powered class. So what does a 40-size ship have to offer that a 60 ship doesn't? Plenty! Building time, kit price, portability, fuel economy, not to mention the fact that many can equal the performance of their larger counterparts. One ship in this category is Southern R/C's new Mustang-X. Designed by the late Jim Kirkland, this ship took fifth place in Pattern at the '72 NATS. That's some airplane!

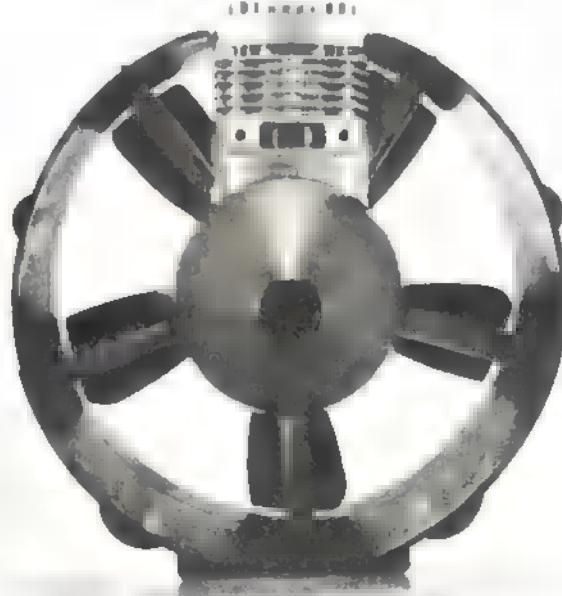
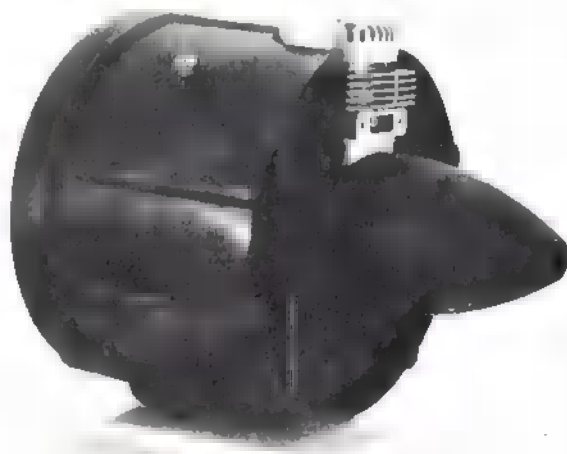
Forty-size airplanes are also becoming available in a wide variety of de-

signs. Joe Bridi showed a line of four new ships, which included a trainer, biplane, aerobatic bird and a pylon trainer. Along the stand-off scale lines, Top Flite showed a scaled down P-51, for 40 power and retracts.

In trend with the kit manufacturers' thinking, we find several radio producers working to reduce the weight and size of their sets to fit into smaller ships. EK had a versatile four-channel brick which allows this system to be used in all types of airplanes with any number of channels. Cannon's new Tini-Twin brick design houses two servos, and all-up weight with four servos is seven oz. There's no doubt that with the trend toward smaller airplanes, we will see more manufacturers duplicating these efforts.

New stand-off scale ships were quite abundant at the show. Popularity of this form of modeling has skyrocketed. Now we have many well designed, scale-looking ships which are docile enough for the sport modeler. Most of these ships are 60-powered, presumably due to the "scale effect" idea that "big is better." Dave Platt, originator of the stand-off scale concept, supplemented his Spitfire kit with a new T-28B. This ship has many features which make it easy to fly, yet its proximity to scale is uncanny. A new manufacturer, D&B Model Aircraft, showed a promising line of glass and foam kits, which include a P-51, P-40, Stuka and a Zero. A special feature of these kits is that they include all the accessories (wheels, spinner, gun-sight, cannons, landing lights, etc.) which are needed to dress up any kit. Top Flite's P-47D had a unique fuselage construction which used a formed top to keep the weight down. This they did, as the all-up weight with retracts is about 7½-8 lb.

In contrast to the large lumbering appearance of the stand-off scale ships are the nimble, dart-like Quarter Midget racers. QM has all but dominated the



The mystery of jet flight solved at last! J.J. Scozzi ducted fan unit impeccably constructed of fiber-filled nylon and aluminum. Unit shown with a racing 40 engine.

Photos by the author, except as noted

STAND-OFF SCALE MODELS

Dave Platt Models	T-28B
D&B Model Aircraft	P-51, P-40, Zero / Stuka
Bud Nosen Scale Sales	Aeronca Champ
Gal Model Products	Bf 109
Hobby Shack	Spitfire, Avromaster
Long Island Hobbycrafts	Sammy Mason's Checkers
Mini Elite	Stampe
Randolph Hobby Distributors	Cessna 150 Aerobat
Sig	P-51
Sure Elite	Vesper
Top Flite Models	P-47G
Teneco International	No. 144-Britain Flyer
Westcoast RC Products	Whitcomb
XL-ent	B-28
RC Kits	Mirage
Teksonic	1050 Thunderchief

40-SIZE MODELS

Bird Hobby Enterprises	Mini-Wayfarer, RC Trainer
JEM	LS-500 / Super Kites Jr.
Tiedwater Hobby Enterprises	Quick 2000
G-B Glass	Counterpart
Hobby Market	Canoe Trainer
Top Flite Models	Quick Fly
Southern RC Products	P-51
Avtronics	Mustang-X
Span Aero Products	Jettie
MACO	Mini-Patfinder
Glen Spickler Aeromodels	Simplex Trainer
	Quickie 2000

QUARTER MIDGET RACERS

Sig	Minnow
Westcoast RC Products	Mini-RJ
Hobby World	Minnow
House of Bells	Mini-Lara
Pop Model Products	Minnow
RC Kits	Thunder Sea Fury

racing scene at Toledo. Of special interest was the Miss R.J. kit presented by Westcoast R/C Products. This ship has a 4.2 oz. epoxy glass fuselage to keep weight to the minimum. The design calls for an inverted engine for easy building and maintenance.

A promising QM powerplant, the Taipan 15 Schneurle was shown at Toledo by Hobby Shack. The "Gold-head" features a rear exhaust with an angled tune pipe/muffler. Workmanship of this engine is tops and the power output is one of the highest available.

There were only a few Form 1 ships interspersed with the myriad of new racing kits offered. Terry Prather showed a prototype Minnow fuselage which he is planning to market in a full kit. A&L Manufacturing has a new Joe Foster designed "Pogo" racer, a sexy machine with all of its curves in the right places. Both ships are designed to minimum specs in order to obtain the lowest times around the pylons.

The biplane craze is definitely here. At the show, Jerry Nelson's new Bipe Association got off the ground. They had

their first meeting, and interest in the biplane area proved to be very high. Manufacturers are responding too, as Midwest is planning to kit Jerry's Pitts Special. Stafford, Bridi and others have kits in the works. Long Island Hobbycrafts showed a nice stand-off scale kit—Sammy Mason's Checkers—which should fit well into this new category.

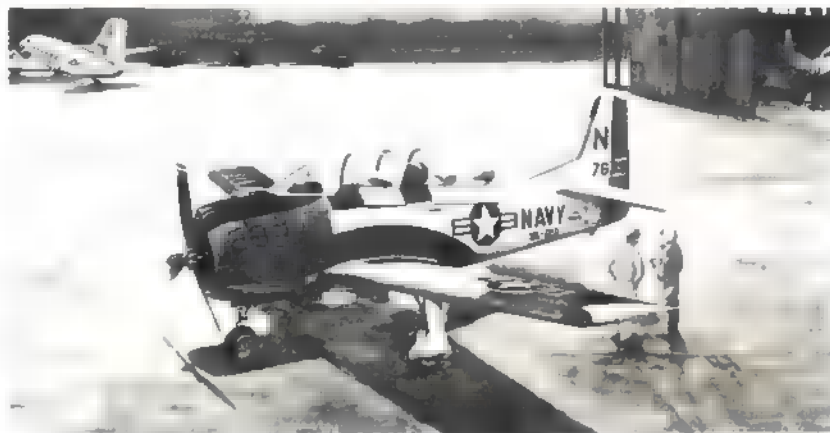
Of significant interest in the engine field was the unveiling of the Kraft 60 motor. Planned to be the first in a series of motors, this engine is aimed at the performance-minded pattern flier. The engine features a swirl combustion system, with a 45° angled exhaust port. It is interesting to note that radio manufacturers are creating diversified product lines, yet to date, Kraft is the first to undertake a whole new product field (outside of nylon molded accessories). Did you ever expect to see a Kraft-Hayes nylon engine?

Any modeler using an engine is going to be interested in this next item. Ross Power, Inc. demonstrated the use of a new additive, called Michl-Mix. Four years in the development by Jim Michaels, the additive is combined with regular gasoline. Because of the shortage of methyl alcohol, this could provide

great relief to modelers in securing fuel for engines.

Ross flew an airplane with his Black Demon 60 at the show. Weak Signals club members, armed with tachometers, measuring vials and stopwatches were there to record the comparison between Michl-Mix and 25 percent nitro fuel. The results: virtually the same tach readings. In fuel economy, the Black Demon drank 12 oz. of fuel for a timed flight of ten min. at full throttle. A second flight, same plane, engine, and duration, this time with Michl-Mix—the engine sipped only 5½ oz. That's more than a 100 percent increase in fuel economy, with the same power. Engines run at the same operating temperature. Price of fuel with this additive will be about the same per gallon as it is with equivalent alcohol fuels—a net result of about half the cost, since you only use half as much.

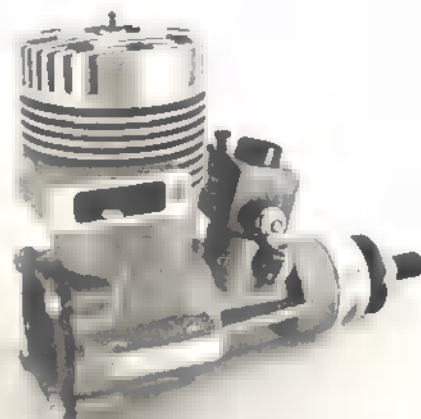
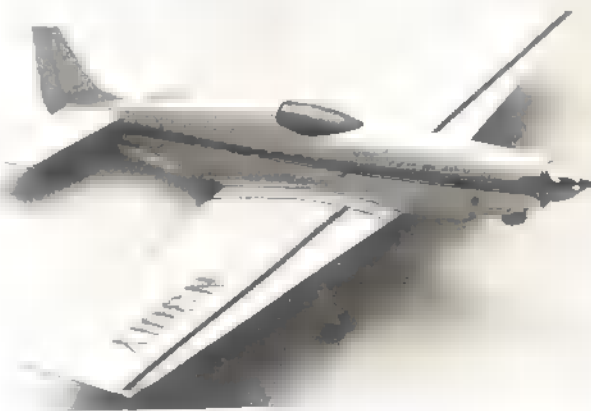
Helicopter activity was a little sluggish, having its ups and downs. It seems that most new choppers were new versions of old designs. Three scale designs were shown: a Balkow from Midwest Model Supply, Schluter's Gazelle, and a Bell chopper from MRC. Sales reports from some 'copter kitters and distribu-



Stand-off Scale was big at this year's show—here we see Jim Newman's drawing of Dave Platt's T-28B. See charts for a complete list of planes displayed.

Hobie Hawk glider—awaiting flight and towing up into the bleak Toledo sky. The molded wings flex very little under tow—that elliptical look is built-in.





ABOVE: EK's versatile four-channel brick design—dual output motor arms, plug for switching controls when converting three to four channels. Still a compact unit. RIGHT: Only brand-new engine at the show was this Kraft 60-45° angled port, Tarno-Carb—a real powerhouse for the performance minded. (Photo by Bill Coons)

tors lead one to believe that this activity has seen its peak. What we really need is a \$125.00 chopper which will handle as easily as an H-Ray. But is this possible? Maybe next year.

BEST OF SHOW

There has always been a huge desire in many modelers' hearts for a jet airplane, and while many attempts have been made to create one, few have been practical or successful. However, J.J. Scozzi, Inc., has created the first ducted fan unit which will make all those sleek designs a practical reality. Critical air-moving parts were computer designed, resulting in over six lb. of thrust with hot 40 engines. This is in the vicinity of most healthy 60 engines. While hot front rotor engines can be used, rear rotor racing engines are going to provide the maximum thrust. Thrust has been measured statically. When in the air, the fan will really unwind (due to impeller gearing) and will send that jet streaking across the sky. All parts of the Scozzi unit are molded from fiber-filled nylon except for the engine mount/strator vanes (an integral unit) which is aluminum. Total versatility for mounting

the unit under a wing, in a fuselage, or on the side of a fuselage is achieved through a rotating strap. Starting the engine is accomplished through conventional means with a starter. Seeing ships with this unit fly, one is struck by the realism: the slow rollout, steady acceleration as the fan gobbles up air, the screaming sound of the impellers unwinding... it is a very exciting experience. Takeoffs are not much longer than normal and landings are no problem—the fan is fully throttleable. AAM will be publishing a practical design incorporating this unit in a future issue. For those who are not scratch builders, Midwest will be kitting this design following publication.

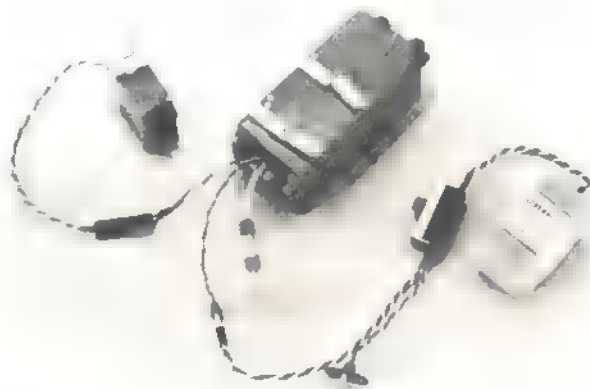
Much as J.J. Scozzi opened up a whole new field of jet flying, the Hobie Model Company has "Altered" the glider field with its first ship, the Hobie Hawk. This soarer, designed by Hobie Alter, utilizes construction techniques never before seen in our industry: pre-formed wing panels of 1/32 and 1/64" ply surrounding a high-density, low-weight foam core; a fuselage with a rotationally molded nose of polyethylene; tailboom of six-layered epoxy fiberglass;

and an ABS molded tailcone. The combination of these materials has created an almost indestructible glider. Two versions are offered: a ship completely finished except for radio installation, and a kit version, which need only be painted, covered and radio installed—both at very reasonable prices!

After seeing this ship flown by Hobie, I'm all set to pack up my glider and donate it to the nearest old folks home for soarers. The Hobie Hawk, with its thin, undercambered airfoil and elliptical polyhedral, performs loops and turns tighter than those of most stunt ships. Its performance in thermals and on the slopes should be a real eye-opener. With a handsome hawk-like appearance, this ship is sure to appeal to even non-glider fans.

These best-of-show items which appeared at Toledo indicate that, despite the realities of an industry plagued by supply problems, rising costs and generally conservative manufacturers, two manufacturers have gone out on a limb to create innovative products.

Refer to AAM's monthly New Product Checklist for detailed reports on the new products seen at Toledo.



LEFT: Miss R.J. QM racer from Westcoast R/C. Numerous new Quarter Midget designs appeared at the show, indicating good growth in this field. ABOVE: Curvaceous Form 1 ship from A&L Manufacturing is designed to minimum racing specifications. This ship is AAM test airplane which will appear in a future issue.

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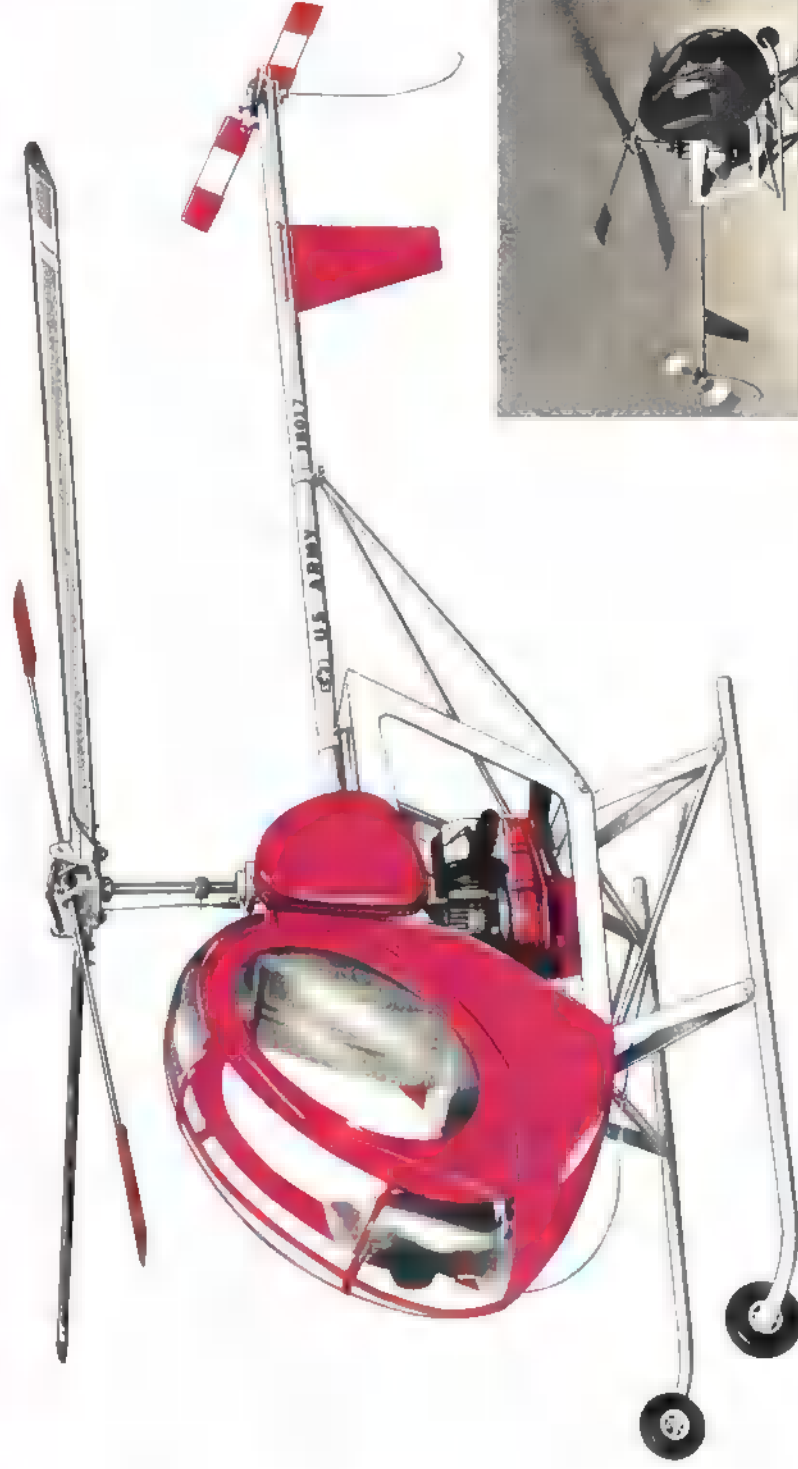
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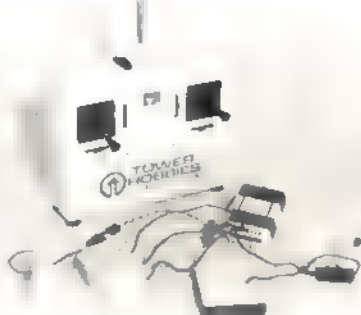
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NEW PRODUCTS CHECKLIST

ERIC MEYERS



deBolt/Jr. Champ. Small 1/2A size RC ship is just the plane for backyard flying. With a super-small two-channel system, this ship is capable of loops, rolls and combination of the two. The kit is all-balsa and full-size plans and hardware are included. Ship has simple design so it can be assembled in a few evenings. \$12.95. Wingspan, 35 in.; area, 225 sq. in. deBolt Model Engineering Co., 3833 Harlem Rd., Buffalo, N.Y. 14215.



Tower Hobbies/Economy Five-Channel. Breaking the \$200 price barrier, this five-channel set has features of radios twice its price. System includes four mini-servos, servo plug-in type receiver, NiCad battery packs, transmitter switch and charging cords. The sticks have tension control; fifth channel is fully proportional. Available on any 27 MHz frequency at no extra charge. Ninety-day guarantee. Complete system price, \$199. Tower Hobbies, P.O. Box 543, Champaign, Ill. 61820.



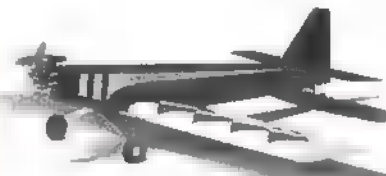
Y&O/Wide Blade Prop. Now available in good quantity and a large selection of sizes, these props have a true helical pitch design plus a double taper, a top-notch combination. Props are made of hard maple or beech; laminated props are from cherry, walnut and ash. Each prop has a hand-applied urethane varnish finish for good looks and fuelproofing. Props available in 35 sizes with 8-18 in. dia. for \$.50 to \$1.75 each. Laminated props—13 sizes available in 9-16 in. dia., \$1.75 to \$3.75. Bill's Mail-Order Hobby, 503 West Astor, Lee's Summit, Mo. 64030.



Monogram Aviation/Messerschmitt Book. Any modeler who is creating a scale Messerschmitt will be interested in this "O-Nine" Gallery which contains many photo gems of the Bf 102, Me 209, carrier Stuka and other obscure versions. The book contains many blueprints and also a color chip page. A comprehensive study of a popular scale subject. \$15. Monogram Aviation Publications, P.O. Box 14, Acton, Mass. 01720.



Peck-Polymers/J3 Cub. Classic design in Peanut scale has a 13-in. span. Modeled after a clipped wing J3 Cub, the safe, simple design characteristics of the full-scale design, have been matched by the model. The result is a very stable flying model. Kit includes all-wood, three-views, mylar press-on decals, prop, wheels and motor. \$2.95. Peck-Polymers, P.O. Box 2498, La Mesa, Calif. 92041.



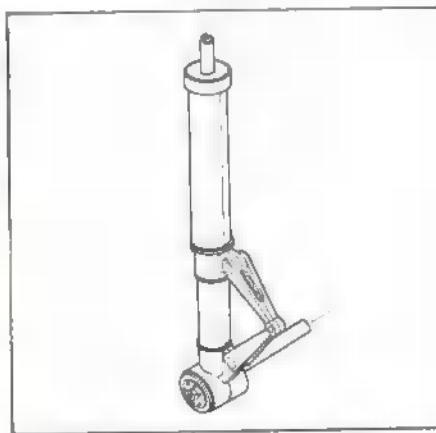
Wolff-Pak/Tadpole. Quarter midget size sport ship could make a good club one-design pylon racer. Straight-forward construction and design, this bird has full aerobatic capability for the sport flier. Kit has fully machine-cut balsa and plywood for accurate and fast assembly. 36 in. span, 11 sq. in. for 15 engines and four-channel radios. \$26.95. Wolff-Pak, 1458 Husted Ave., San Jose, Calif. 95125.



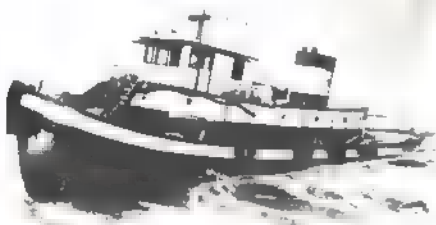
JoMac 1/12 Scale Car. New ultra-high performance Jerabee type car contains almost all hop-up accessories available plus many spare parts. Kit features: dual ported engine, perforated tank, challenger and new "Shadow" bodies, heat sink, trued tires, Lexan chassis, and all parts contained in the Mk 8B kit. Kit comes complete with engine and radio, nothing else is needed. \$140. JoMac Products, 12702-A NE 124th St., Kirkland, Wash. 98033.



Craft-Air/Drifter. Standard class six-ft. span glider has many features to give a high performance in thermal soaring. Features are: modified Horner tips, turbulators, polyhedral breaks, raked rudder hinge line. Kit has all-machined balsa parts for easy building and good fit. A good kit for the beginner, yet a design which will appeal to performance-minded experienced pilots. \$24.95. Craft-Air, 5651 Kelvin Ave., Woodland Hills, Calif. 91364.



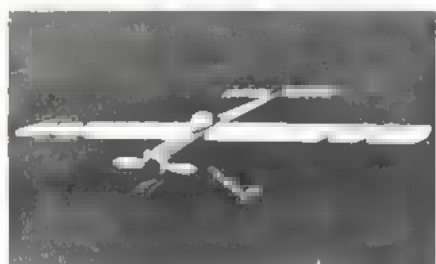
Robert/Gear Strut. For those who want to dress up their stand-off scale or sport ships, these gear strut covers should be just right. The coverings fit over 5/32" dia. wire and may be adapted to any strut length. Drag link may face forward or backward. Tri-Gear—\$1.98. Main Gear—\$1.69. Robert Manufacturing Co., P.O. Box 122, Wheaton, Ill. 60187.



Canadian Scale/Argue Martin. One in a series of "Ships of the Great Lakes," this Argue Martin measures 29 in. in length. The model is suitable for static display or RC running version. The kit has a planked hull style construction and includes precut parts (finishing required), fully detailed drawings, history and helpful construction hints. Canadian Scale Models, 534 Hugheson St., North, Hamilton, Ontario, Canada.



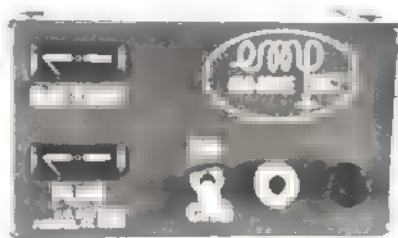
MRP/Funny Car. Prototype of this car was tested at the RC Nationals in Indianapolis where it placed second in its class. The chassis is for 19 size engines and two- or three-channel radio gear. Available in two body styles: Vega (shown) or Mach 1 Mustang. \$109.95. Model Racing Products, 12705-A, NE 124th St., Kirkland, Wash. 98033.



J.E.M./"Quick One". Sport flying ship for 19-40 size engines designed to be quick building, have effortless maintenance and easy takeoff and landing characteristics with good low speed stability. Ship has a 51-in. span and weighs 3-4 lb. Included in kit are foam wing cores, diecut balsa and hardwood parts, preformed L.G. plans, hardware and decals. \$34.95. J.E.M. Enterprises, 521 Bies St., Michigan City, Ind. 46360.



RC Kits/Acro-Trainer. Huge wing area (over 750 sq. in.) makes this a very docile ship, capable of very slow landings and short takeoffs. However, with a honking 60 in the front end, the airplane takes on acrobatic potential. Balsa fuse, foam wing, (1/16" balsa sheeting provided), quick assembly time. Ship can use trike or conventional gear. \$44.95. With pre-sheeted wing, \$59.95. RC Kits Manufacturing, 353 Briar Ave., North, Canton, Ohio 44720.



EMP/Battery-Plug Analyzer. This unit called "Glo-Brite" contains a 4AH NiCad cell for powerful starting capability plus internal charging circuit. The face of the unit has two meters: one for battery condition under load; the other for determining plug and battery condition. Observation of the plug meter will tell why an engine is not firing. \$29.95. Electronic Model Products, P.O. Box 20462, Phoenix, Ariz. 85036.



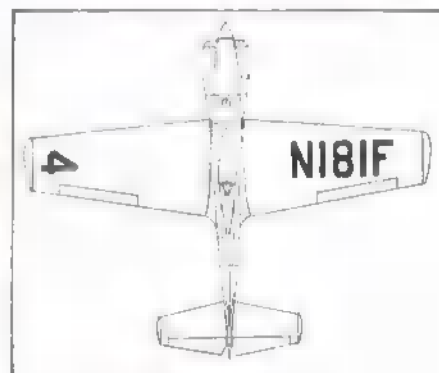
Space Age/Flying Saucer. Fly your own UFO with this nine-ft. dia. hot-air balloon, which will rise hundreds of feet into the air. Balloon comes in kit form with gores, model tissue, and instructions for assembling, inflating and launching. Model can carry parachutes, cameras, planes or flashlights aloft for interesting "experiments." \$4. Space Age Distributing Co., 421 Fontenelle St., S.E., Grand Rapids, Mich. 49508.



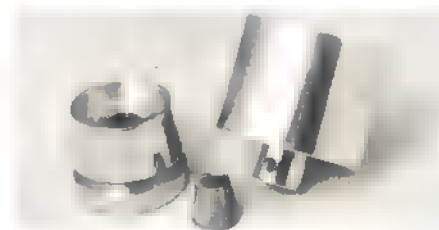
MRC/Hook-on Pump. Completely self-contained pump from MRC contains pencil compartment in lower half of housing. Pump is reversible for emptying tank and special switch guard prevents switch from accidentally being turned on in transit. Pump is geared for long battery life and is self-priming. Three-volt or six-volt model available. \$10.95. Model Rectifier Corporation, 2500 Woodbridge Ave., Edison, N. J. 08817.



Midwest Model Supply/Optac Tachometer. English-made Skyleader tachometer converts light impulses into electronic signals to obtain high accuracy readings from two-bladed props, flywheels, etc. This tach has three scales: 0-25,000 (good for general readings); 15-20,000 (for pylon racers) and a 20-25,000 range (for rat racers, FAI, FF, etc.). Only tach available for these specific fields of modeling where accurate, high rpm ranges are used. Great for those 15 QM racers and 049 engines—no power is lost as with a mechanical tach. Solid state components, easy to read scales, low battery drain. \$59.95. Midwest Model Supply Co., 6929 W. 59th St., Chicago, Ill. 60638.



A&L/Lazor-Rautenstauch. Popularly known as the "Pogo," this new racer is possibly destined to be the most winning ship of the Formula 1 racing circuit. Joe Foster's very clean design is kitted in a fiberglass fuse and foam wing, with many features built-in for quick building. Wings are covered with the 1/64" ply skin (included). Racer is designed to minimum specs so watch out—this ship is going to be fast. The "LR-1a" sells for \$59.95. A&L Manufacturing, 16509 Saticoy St., Van Nuys, Calif. 91406.



Virginia Craftmen/Spinner Cup-Flywheels. Neat accessory for the Penford electric starter replaces the plastic spinner cone with this flashy chrome cone with two set screws for positive lock. Cone will really enhance the appearance of starter. \$3.50. Flywheel shown is for 15 engines and is good for both hydro and ski boats. Other sizes are for 19-40 and 60 engines, 15 and 19, \$3.00; 40 and 60, \$4.50. Virginia Craftmen, Inc., 4902 Embassy Dr., Richmond, Virg. 23230.

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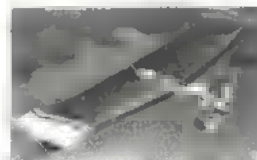


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JOHNNIE SMITH ON CL

Warning: DANGEROUS!: A number of recent magazine articles, and at least one publication put out by a nationally known model distributor, have mentioned the use of nitrobenzene as a possible glow-fuel additive. *Please Do Not Use It!* Toxicology handbooks place nitrobenzene in the same category as carbon tetrachloride. These are highly toxic when absorbed through the skin, inhaled or ingested. The toxic effects are cumulative (the body will not throw them off, but they will build up over time until damage to the body results). Some of the symptoms of toxic poisoning are: blueness in lips and skin, mild euphoria, headaches, drowsiness, nausea, vomiting, stupor and finally—death!

Nitrobenzene converts hemoglobin in the blood to methemoglobin, and makes the blood incapable of releasing oxygen to the body tissue. This leads to tissue anoxia which, in turn, results in varying degrees of asphyxia (Doc Jackson, correct me if I'm wrong). This nasty stuff, also known as oil of mirbane, smells like shoe polish.

With air having a density of 1.0, and nitrobenzene at 4.2, this stuff could be in vaporous form along the floor, being absorbed through your ankles without you even knowing it. So if you've never used it, don't start. If you have some around, get rid of it! If you hear or know of anybody still using it or recommending its use, set them straight. We need all of you to get this stuff out of the workshops.

Toledo Conference: What is a control liner doing at an RC Trade Show? This has become an annual pilgrimage for many of us, since it's one place we can get together without the airplanes to worry about. Many items shown

(which AAM will cover in its own report of the show) are useful in our racing models. Rev-Up had their new narrow-blade racing props ready. Randy's fuel booth showed their complete line of Rat Race tanks, wheels, fast fills, etc. They also stock pen bladders in two sizes, for those who use them.

The one item that was "best of show," as far as new ideas go, was Bob Violett's ducted fan assembly for 40 engines. According to Bob's figures, the fan puts out 6+ lb. of thrust, at 18,000 rpm's. This is much higher than a stock "prop" set up, and might start a new trend in 40 Class Speed and Rat Race.

The speed fliers, to whom I talked, all had their own ideas as to possible rules' changes. However, since the new rule book wasn't out at the time, changes and proposals will come slowly this year. All new proposals have to be in the hands of the CLCB by June 1. The next proposal deadline will be June of 1976. I asked AMA officials for an extension (for this year) until September 1, but the Executive Council will have to make this decision at their March meeting, in Lake Charles.

That S.O.B. At Toledo: I had the pleasure (?) of meeting Harold "Goldie" Goldclank, clown prince of the RC fraternity. He is a member of the S.O.B.s (Sons of Brooklyn), which should put you on your guard to begin with. He is a bit like the NATS—you hear about it, but when you see it, you still don't believe it. I spent about a half hour with him. . . and, in that time, he didn't complete one sentence. You're a great part of the sport, Goldie, you have just one problem. When you pass on to the great model shop in the sky, they'll have to kill your mouth separately! Next year I'll be ready for you.

Engine Handbook: A new book (at least to us) which should make every one an instant expert in engines is available. It is the *Two-Stroke Tuners Handbook* by Gordon Jennings. Copyright 1973, obtainable from WEBCO, 218 Main Street, Venice, Calif. 90291. 156 pages, \$3.95.

Handbook: Bill Pardue is compiling a list of equipment manufacturers, and is looking for any new suppliers of racing goodies. Next month I will cover his list in this column. In the meantime, send your information to: Bill Pardue, 1201 Surry Drive, Greensboro, N.C. 27408.

Coming Contests: July 20-21, Cincinnati, Ohio; info from Bill Messerly, Eight Mile Rd. All speed events, including Junior Profile 1/2A and 1/4A Proto. The rest of the Speed events are combined age groups, flying for a percentage of the records in each class. This is an AAA meet, on blacktop circles. One member will have a gas station open on Sunday, to top off contestants' tanks! Make this one.

Also, Cleveland is planning a three-day meet over Labor Day Weekend. This will be the 39th annual running of the Cleveland Junior Air Races. Every CL event in the book, plus regular specialty events, is scheduled. Camping facilities available on site. Contact Bob Sargent, 1694 Wright Ave., Rocky River, Ohio 44116.

Not to be outdone by Don Lowe in his RC column a couple of issues back, I leave you with this thought:

If we all want to meet,
And make them go fast(er),
Get down on your knees. . .
Put your eyes to the skys. . .
And pray to the Man for gas.



Frank Kelly's 1/2A Proto speed ship. Model sports a fiberglass fuselage and a single-bladed prop.

NMPRA Pylon Championships

Again, the West Coast played host to the nation's fastest competitors in Formula I and FAI. It turned out to be the race to beat ■ all races.
by Bob Stockwell

After the regular racing season had closed, and after the season standings in all NMPRA districts had been established, the top 20 percent from each district were eligible to attend the NMPRA Championship race. Since the financial outlay required for Easterners and Midwesterners to attend ■ California race was substantial, it was not to be expected that all who were eligible would show up. Surprisingly, nearly 40 fliers

from outside the Southern California district did come. They were to participate in a race at the new facilities (the asphalt was laid just the day before Thanksgiving) in the Sepulveda Dam Reservoir area. A total of 71 pilots entered the contest, and there ■ 96 racers lined up to be handicap-judged on Friday morning.

This was surely the most important and, in every way, the most impressive

contest in Formula I Pylon Racing ever held. It was the first for which there was any kind of screening prior to entry: you had to have done well in your district in order to qualify. It was the first contest of national stature (except for the Internats) at which heat rotation was used from beginning to end so that everyone who entered got the same amount of flying. It was under exceptionally competent and experienced management by the Southern California VP Chuck Smith. The team of Jerry and Jeanie Christianson, and the 1974 NMPRA President Glen Spickler officiated on the starting line.

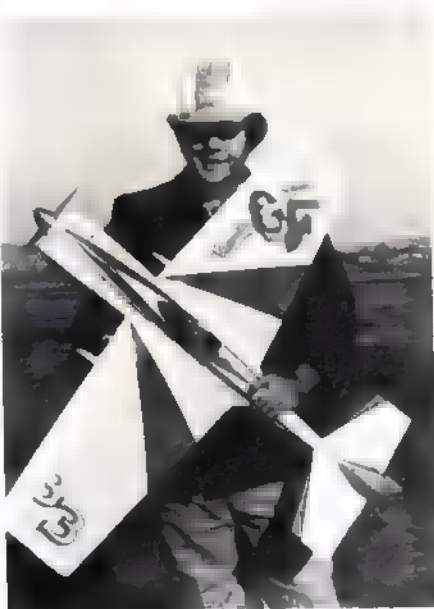
Trophies were available down to 15th place in Formula I and down to seventh place in FAI. The event is assured of continuation for at least two more years, with 1974 already planned for Florida, and 1975 for Texas. Because everybody in this race was ■ proven expert, based on his season's performance, nearly every heat was extremely competitive. It was not surprising, therefore, that all heats were flown right down to the wire—racing at its best.

New record times for 10 laps were twice established and once broken. Kent Nagy posted ■ 1:21.6, ■ new record (his record from earlier in the year was



Bob Violett, NMPRA Formula I Champion and FAI Champion, 1973.

Photo by Sam Chambliss



LEFT ■ ABOVE LEFT: Monty Moncrief brought out a plane-load of fliers from Texas. ■ ■ Bandito has this intriguing hand-painted legend. ABOVE: Marciel Davila has second thoughts about having left the warm temperatures of Mexico City to ■ in the cold of Los Angeles. ABOVE RIGHT: Newly-elected VP for the NMPRA, Southern California District, is Jerry Silverman. He'll have his hands full trying to top the exceptional term in office of his predecessor, Chuck Smith.

1:21.9). This was promptly matched by Terry Prather. Then Nagy posted ■ sizzling 1:21.2, which will now stand as a record, at least until next season. But, in the end, neither Nagy nor Prather, though they had the fastest times, were quite as consistent as Bob Violet.

Though his best time was 1:23.8, Violet beat Nagy in the ninth round, when it appeared that Nagy's engine had gone over the hill. Prather was beaten by Bob Smith in the second round, when Prather got off with ■ rich setting on the needle. Bob Smith in turn was beaten by Whit Stockwell, ■ Bob took a cut on the first pylon. Dan McCan's otherwise perfect score was spoiled by a second to Violet. But then Bob Violet was beaten in a spectacularly perfect race by Bob Smith—probably the prettiest race I have ever had the pleasure of watching. Smith took off first, and the distance between them all the way for 10 laps was just a one-sec. margin. Neither one made the slightest mistake, and their planes were exactly matched for speed and handling.

Thus, the stage was set for ■ four-way fly-off for first place; McCan, Smith, Prather, and Violet were each one point down from a perfect score after nine rounds. It was late on Sunday afternoon, and there was barely enough light left for one final heat. The four of them agreed to a race horse start, thus removing the starting advantage that had allowed Smith to beat Violet earlier. The counters, the flag men and the pylon cut judges were all experienced fliers and workers, who could be counted on not to foul up this exciting confrontation of the four top competitors.

It's hard to believe how it came out: McCan crashed around the third pylon, Smith got two cuts fairly early in the race, Violet got one cut in the third or fourth lap. This left the race to Prather who, by the sixth lap, had it all to himself. But he didn't know he had it all to himself, and so he went on flying it tight—and took two cuts in his last two laps. While this was going on, Violet

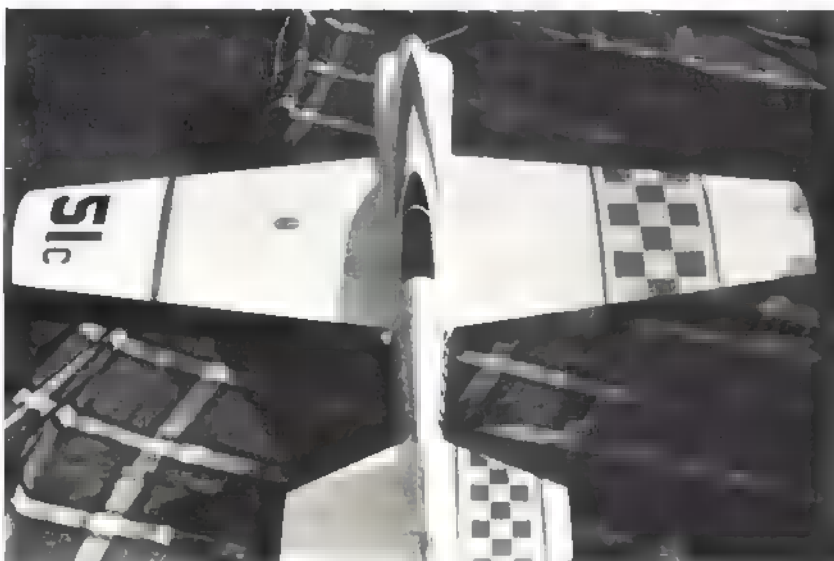
(Continued on page 76)



The hard-working lap counters. There were no nine-lap occurrences during the entire championships.



The start of a perfect race. Cathy Smith releases Bob's Miss DARA. Next off ■■ marks will be Bob Violet and then Jim Maki.



ABOVE LEFT: Ed Rankin, 1973 President of NMPRA, ■■■ from Texas to break the curse of crashing three new Formula 1 birds during the two weeks before the ■■■

ABOVE CENTER: Everyone thought that Terry Prather had won the first fly-off. Some almost unnoticed cuts during his last laps bumped him to second.

ABOVE: ■■ Smith and caller/wife Cathy. Bob is Southern California District Champ, National NMPRA Season Champ, and winner of the '73 NATS. Being that busy, how does he find the time to get cold?

LEFT: Totally new Miss DARA by Bob Smith was built from a new super-slim fuselage mold. Bob also changed his traditional paint scheme.

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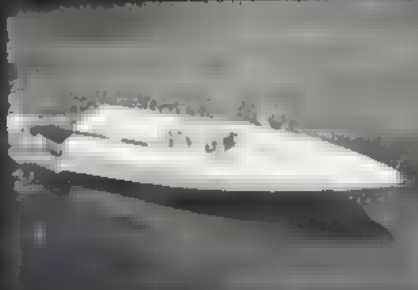
SK Daddle Jr.

a semi scale RC boat for
.049 engines 18" long
— kit #SK-3
\$9.50
plywood & mahogany
construction



SK Daddle 20

a dependable high
performance racing boat
designed by Steve Muck
for .20 engines 26"
long — kit #SK-20
\$18.95
plywood construction



SK Daddle

a great competition boat
with a new bottom design
for even higher top speeds
faster in the turns for
.32 engines 32" long —
kit #SK-40
\$29.95
plywood construction



SK Daddle Too

a semi scale model of the
Hallet ski boat for .20
engines 27" long —
kit #SK-2
\$15.95
plywood and mahogany
construction



SK Daddle 20F

a fiberglass model of the
SK 20 for those who want
less building to Hull
& deck are joined.
Available with gold, green,
red metalflake or
white hull
26" long —
kit #SK-20F
\$49.95



SK Daddle

the big model of the Hallet
ski boat for .35 to .65
engines 36" long — kit #SK-1
\$26.95
plywood & mahogany
construction



**dumas
boats**

Dumas
Products, Inc.
790 Park Ave.
Tucson,
Arizona 85719

Monsters and Monoplanes

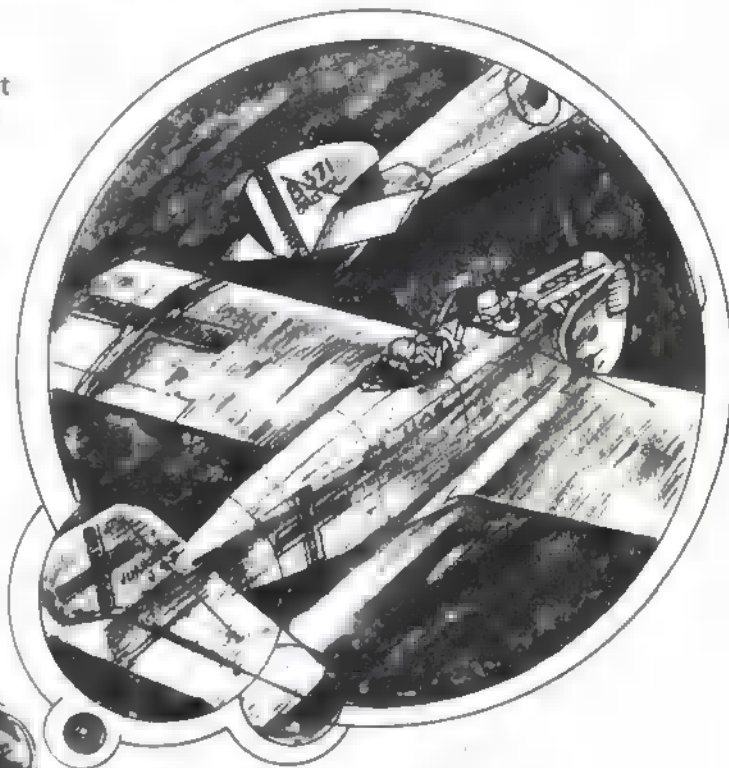
All WWI Aces to the flight line. . .

Monsters and Monoplanes are here to test your skills. Don't just dream about aerial combat action. Clear the workbench for the successors to Bipes 'N Tripes. by John and Hugh Hunton with text by Patrick H. Potega.

This saga began with Bipes 'n Tripes (March AAM), and continues because of their immediate success in CL circles everywhere. Cries for further developments came from both the Enemy and Allied camps. The Enemy wanted some impressively immense planes, bigger than all the rest. Perhaps they wanted to scare away invaders with sheer size. The Allies wanted snappy fighters, but something faster than their Sopwith Camels and Triplanes.

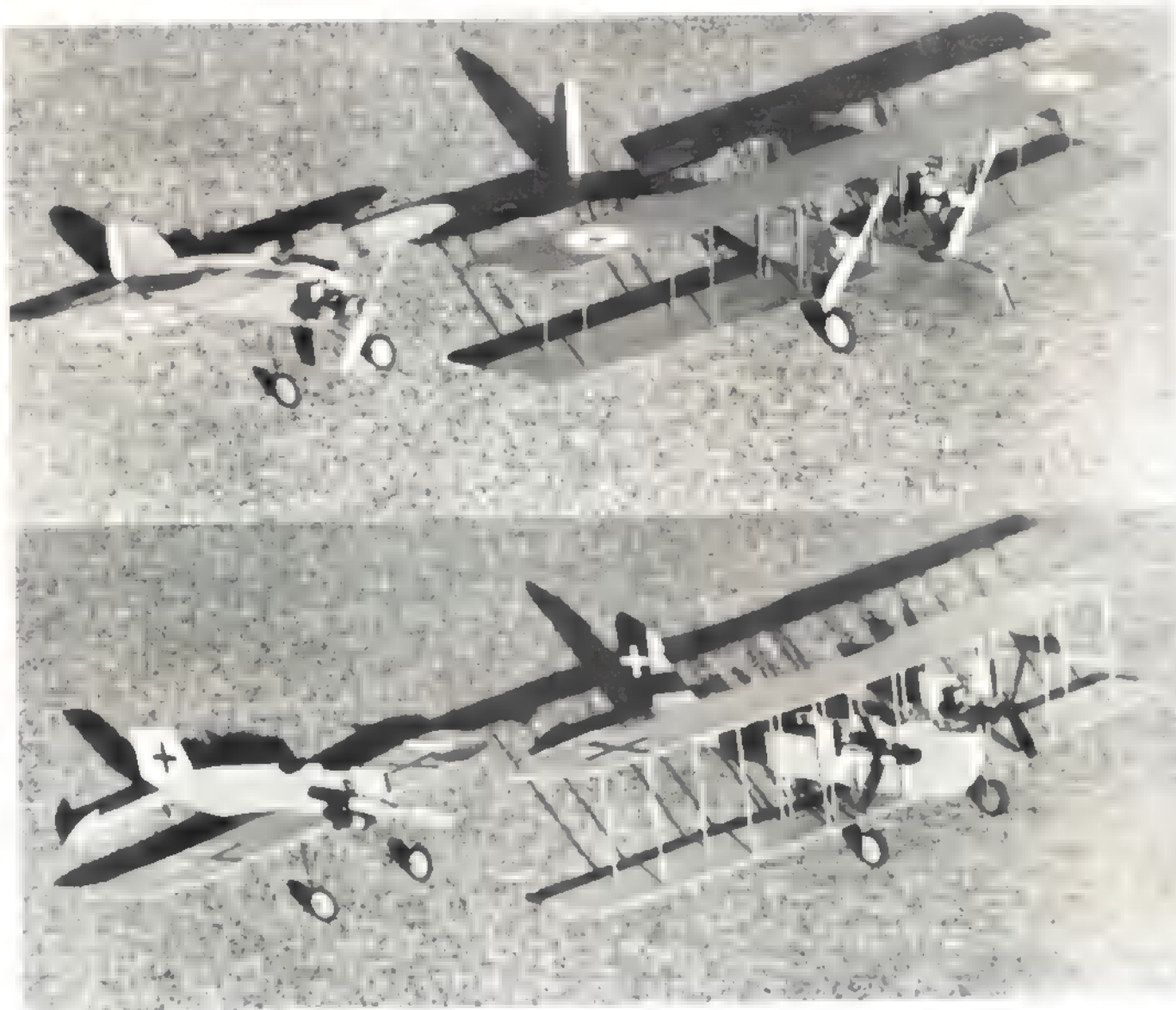
The monsters, huge lumbering hunks of balsa, fit the Enemy's specifications just fine; and the zippy monoplanes were quite the cup of tea of the Allies. But, as often happens, word of the latest designs got out to the opposing camps, and soon each side was clamoring for *both* monsters and monoplanes.

As these planes moved into action, combat took on a totally new image. Can you picture four planes in the circle at once? The bipes and tripes buzz and strafe, while the monsters drone on toward some bombing target. The monoplanes fly to cover—they have aerial supremacy for the moment. Suddenly, the Enemy bipe (a D-7) dives after the Allied monster, just as the huge machine is about to pulverize ■

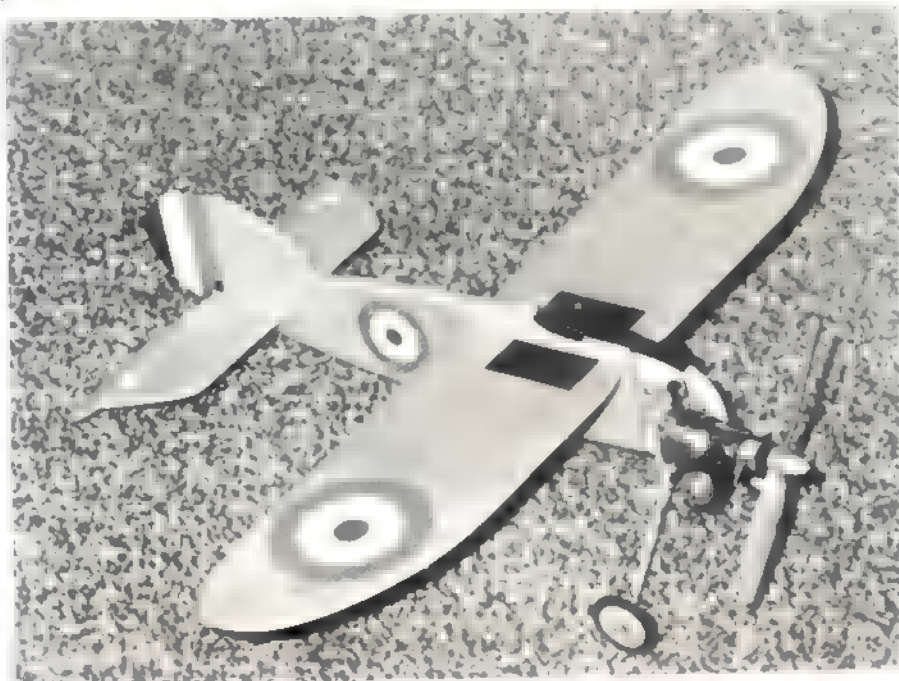


BIPES + TRIPES
MONSTERS AND MONOPES

Photos by the Authors
Illustrations by Don Schultz



ABOVE: The Enemy and Allies match each other plans for plane. BELOW: A jolly good monoplane, ol' chap! The Bristol is a quicky to build. The insignia on this one were hand painted.



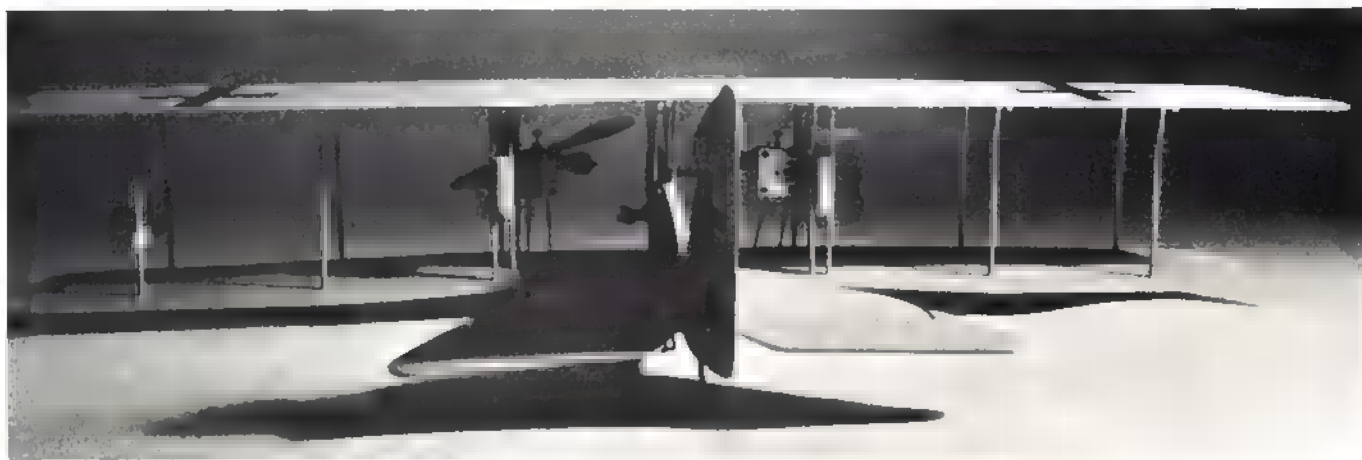
Iron Crossed tripe with engine troubles. The Allied Bristol Monoplane responds too late, and the biplane scores an easy victory. The monster wallows for a moment, stalls and plummets to the ground like a sick vulture. That's the kind of action a quartet of these models can offer—a riot for fliers and spectators alike.

Getting in on this action is easy. Grab an X-acto knife and a bottle of glue, and you'll be airborne in no time. Take a set of AAM Sudden Service Plans (they are only a buck, including free Tenderfoot decals, and it's easier than scaling up the page plans) and glue them to a piece of tag or posterboard. Do a good job of cutting out the cardboard templates, since everyone in the neighborhood will want to use them. (Caution: Aiding the Enemy is forbidden, but makes for a lot more fun.)

The quickest way to build these models is to mark off each step as it is completed.

Monoplane Construction

□ The 1/16" aluminum motor mounts can be fashioned with tin snips or a razor saw. An aluminum lawn chair arm (the flat type, not tubular) is al-



ABOVE ■ RIGHT: A regular forest of struts support the wings. They're all necessary, too; ■ don't leave any of them out.

ready prebent and requires only cutting to size.

□ Remove the engine tank back and rotate it 90°, so that the glow head is to the right when the needle valve points straight up (viewed from the rear). Make sure the fuel pick-up tube inside the tank goes to the bottom outside corner.

□ Glue the 1/8" plywood motor mount backup to the fuselage.

□ Bend the landing gear wire and secure it behind the engine.

□ Mark the engine mount location on the fuselage and test fit the complete engine, mount and landing gear assembly. Note: Make sure that there is a slight offset to the engine, pointing to the outside of the circle.

□ Remove this whole assembly temporarily, and accurately cut the slots for the wing and stab in the fuse.

□ Join the elevators, if required on the plan. Add the control horn, and hinge the elevator to the stab with cloth hinges.

□ Glue in the rudder offset.

□ Glue the tailskid in place.

□ Align the rudder and stab assemblies on the fuselage. When it's straight, glue permanently in place.

□ Presand the wing with extra-fine paper.

□ Install the 1/8" ply control mount to the top of the inside wing panel. Also glue the 1/8" ply line guide into its slot in the wing. The guide is on the top of the wing.

□ Slide the wing into the fuselage slot. Align it with the stab and, when it's straight, glue the wing solidly to the fuselage. Fill the small slot at the back of the wing with scrap balsa.

□ Glue the 1/8" balsa wing doublers at their designated locations on both the inside and outside wing panels.

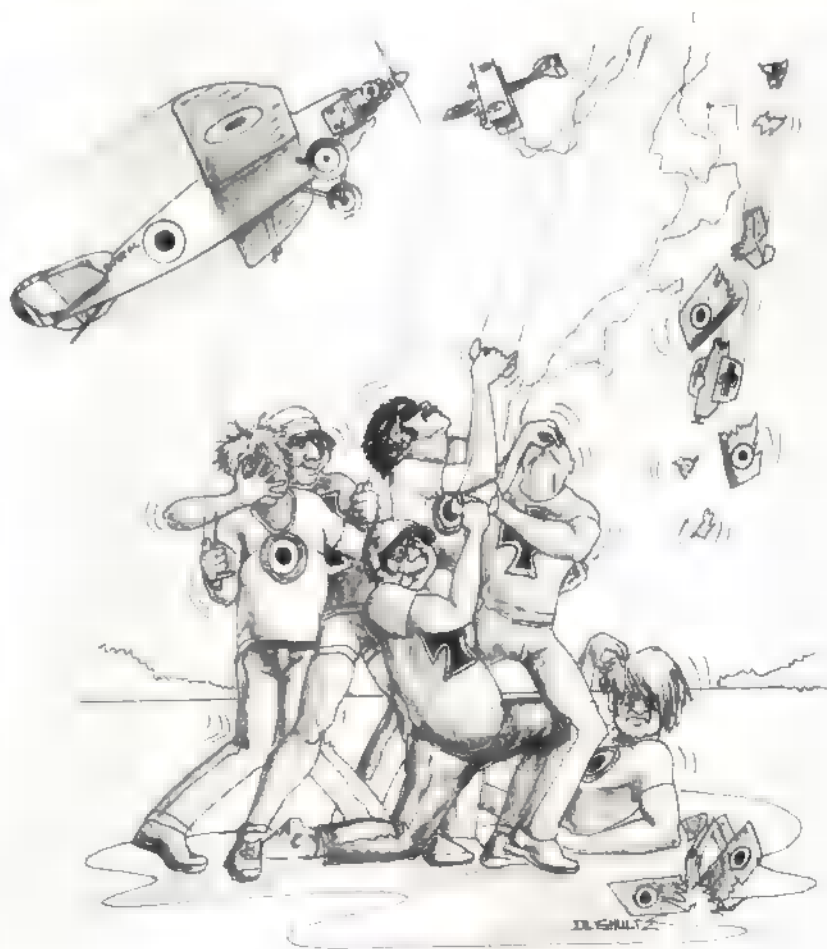
□ Install the bellcrank and bend a 1/16" music wire pushrod to size. Make sure that the linkages move freely.

□ Remove all the linkages, and finish the model according to the instructions on the plans.

□ Re-install the controls and engine assembly. Secure the wheels and go flying (or, if the weather is bad, build a monster).

Text continued on page 85

Plans on page 38



MULTI CHANNEL



THE CONTENDER—The first all-balsa R/C model you can build in just 8 hrs. Wing Span: 54" Eng.: 29 to .60. Kit RC-15 **\$39.95**

KWIK-FLT III... World and twice Nats. winner. Designed by Phil Kraft. Span: 48" Eng.: 45 to 61 Kit RC-12 includes jig for true straight wing **\$52.50**

R/C NOBLER Radio version of the winningest stunt model of all time. Wing Span: 51" Eng.: 35 to .45. Kit RC-14 **\$32.95**

R/C SCALE AND STANDOFF SCALE

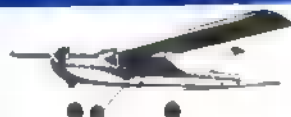


S.E.S.... Never before has a R/C scale model been designed with such attention to the most insignificant detail. Wing Span: 52" Eng.: 45 to .60 Kit RC-13 **\$52.50**

MUSTANG P-51... A standoff scale model that only a ruler can tell from a true scale plane. Wing Span: 60" Eng.: 40 to .60. Kit RC-16 **\$49.95**

WARHAWK P-40... Now in answer to your many requests. Span: 48" Eng.: 40 to .60. Kit RC-17 **\$52.50**

HEADMASTER



HEADMASTER... America's best R/C trainer, for up to 8 channels. Span: 48" Eng.: .09-.35 Kit RC-11 **\$19.95**

TOP DAWG Single or multi channel for sport or pylon racing. Span: 39.5" Eng.: .049-.15 Kit RC-10 **\$16.95**

SCHOOLMASTER... Single or multi channel with rudder, elevator and engine control. Span: 39" Eng.: .049-.090 Kit RC-8 **\$10.95**

SCHOOLGIRL... Span: 32" Eng.: .020-.049 Kit RC-9 **\$8.95**

SCHOOLBOY... Span: 29" Eng.: .010-.020 Kit RC-3 **\$6.50**

SEMI SCALE STUNTERS



HAWKER HURRICANE... Span: 42" Eng.: .19-.35 Kit S-51 **\$9.95**

CURTISS P-40 TIGER SHARK... Span: 42" Eng.: .19-.35 Kit S-50 **\$9.95**



for those
who insist on the
**VERY
BEST!**

CONTROL LINE SCALE MODELS

SUPER FORM PREFORMED FUSELAGE SHELLS FOR FAST STURDY CONSTRUCTION



P-40 WARHAWK... Span: 28" Eng.: .15-.29 Kit S-1 **\$13.95**

P-47 THUNDERBOLT... Span: 27" Eng.: .15-.29 Kit S-2 **\$13.95**

P-51D MUSTANG... Span: 37" Eng.: .29-.35 Kit S-3 **\$19.95**

1/2 A FLITE FLITES (SCALE U/C)



ZERO... Span: 18" Kit S-20

HELLCAT... Span: 18" Kit S-21

THUNDERBOLT... Span: 18" Kit S-22 **\$3.50**

CONTROL LINE STUNT PLANES



REPEATED NATIONALS AND WORLD CHAMP.

NOBLER... Winningest plane of all time. Span: 50" Eng.: .19-.35 Kit N-1 **\$17.95**

NATIONAL AYSC PLACE WINNER

JUNIOR NOBLER... For expert or novice. Span: 40" Eng.: .15-.25 Kit N-6 **\$10.95**



PEACEMAKER... Superform for fast construction, exceptionally durable. Span: 46" Eng.: .15-.29 Kit N-7 **\$12.50**

FAMOUS FLITE STREAK FAMILY



**NATIONALS
COMBAT
WINNER**

FLITE STREAK... Combat stunt flying at terrific speeds. Span: 42" Eng.: .15-.35 Kit N-2 **\$8.95**

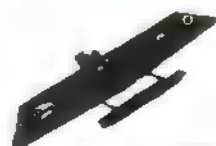
AYSC CHAMPION... **FLITE STREAK**... Span: 31" Eng.: .15-.25 Kit N-3 **\$6.95**

FLITE STREAK... Span: 24 1/2" Eng.: .049-.099 Kit N-4 **\$3.95**

COMBAT STREAK... Span: 42" Eng.: .19-.35 Kit N-5 **\$8.95**

STREAK TRAINER... Span: 33" Eng.: .15-.19 Kit N-10 **\$9.95**

CONTROL LINE COMBAT MODELS



COMBAT CATS... Two complete models in one box. Span: 39 1/2" Eng.: .19-.35 Kit N-8 **\$9.95** (2 models)



COMBAT KITTENS... Span: 22 1/2" Eng.: .049 Kit N-9 **\$6.50** (2 models)

TOP FLITE MODELS, INC. 2635 S. WABASH, CHICAGO, ILL. 60616

CARL MARONEY ON RC

New Officers In LSF: Every two years, new officers are elected to guide the LSF organization. The LSF officers for 1974/75 are: President—Dan Pruss, LSF 060, Route 2, Plainfield, Ill. 60544; Vice President—Barbara Henon, LSF 250, 1042 Embury St., Pacific Palisades, Calif. 90272; Secretary—John Nielson, LSF 240, 3744 Lake Ave., Wilmette, Ill. 60091; and Treasurer—Hugh Stock, LSF 134, 12446 Palmtag Drive, Saratoga, Calif. 94076.

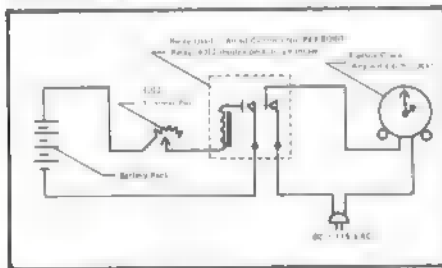
All four are well-known RC glider pilots. Dan Pruss has been organizing the US/RC Glider National meets since 1970. Barbara Henon won the 1972 LSF Tournament. John Nielson was a US Team member at the 1971 International FAI Glider contest held at Doylestown during the eighth World Championship. Hugh Stock is the designer of the Soarcraft Kestral and Libelle RC Glider kits. In all, they are a very talented group of officers.

How Much Time: Langley Field physicist Dr. William Hewitt Phillips has devised a simple test instrument to determine the amount of additional time one's flyer can remain aloft before the airborne battery pack reaches its turning point.

Usually battery life isn't much of a concern in contest flying, but when slope soaring in the mountains, where landings can be extremely hazardous, flights of 2-3 hours are very common. This is when the flier may begin to worry about the remaining power in his batteries. When will the power be exhausted and let his flyer down in the tall timbers?

Several magazine articles have been published on the care of NiCads. NiCad power packs usually require disassembly, then discharging the cells through flashlight bulbs while keeping a constant vigil, etc. Not many modelers have this much free time... nor the dedication. The circuit diagram illustrated will enable the modeler to determine the time remaining in the battery pack, and involves very little time.

The procedure is: first, fly the model as long as you consider it safe. Then, when you get home, plug the battery pack into the device. This will allow a discharge at about the same rate as in flight. As soon as the battery starts to discharge, the electric clock is triggered (initially set at 12 o'clock for convenience). When the voltage of the four-cell pack drops to four volts, the relay drops out, and the discharge stops. The clock also stops, thus giving a readout of how much longer you could have flown.



The reason for the four-volt limit is that NiCads deliver 1.2 volts per cell until nearly discharged; then they will drop rapidly to zero. However, if one cell goes dead before the others, the cells should not be allowed to discharge further. If they do, the good cells pump current through the dead cell in a reverse charge direction, which may cause the weak cell to become damaged or blow up.

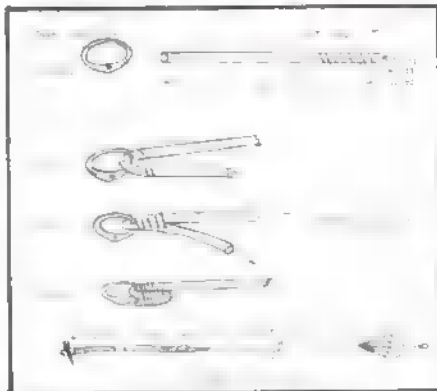
If one cell is dead and the others are good, the voltage will drop below four volts, causing the circuit to be broken. It is a good idea to check the voltage of each cell after the test. If one is zero, that cell should be looked upon with much suspicion.

The following steps are required to set up this test equipment: (1) connect a voltmeter across the relay, (2) insert a charged battery pack, (3) turn up the trimmer pot until the voltage across the relay is exactly four volts, (4) adjust the relay spring tension (or insert thin mylar strips between the relay core and armature), until the relay just drops out at four volts, (5) run the trimmer pot back to zero, and you are ready to go. It will be necessary to close the relay by hand, since the voltage required to pull in a relay is considerably greater than that needed to allow it to drop

out. With a 40 ohm relay, the current drain is 100-125 ma, which is considered an average flight value.

Pop Top Rings: Donald Musante, who is serving in the USAF at Vandenberg AFB, Calif., has come up with an inexpensive fastener to bind the cord endings of hi-starts. This idea gives a neat and safe method to attach tow lines to the rubber, and also helps in anchoring the tie-down end. The basic idea used by Musante is similar to the way control line fliers wrap standard cable. However, electrical tape is used to secure the cord ends to the pop top rings.

Should you decide to use this idea, look at several different pop top rings, they may not have the required construction. Before any of these can be used, the riveted ring tab must be removed. Starting with Step 1, wrap three in. of cord with electrical tape, as shown



in the sketch. Loop this portion of the hi-start rubber through the pop top ring (Step 2), and center the taped section. Stretch both sides of the cord while wrapping several turns of electrical tape, as per Step 3. Finally, loop back the loose end towards the ring and again wrap with tape. I have used this system for over a year. No failures or fatiguing has been experienced with it.

National Soaring Circuit: For the first time, 23 radio control clubs from across the United States have joined together to run RC soaring contests in 1974. They will use a common set of rules, with separate classes of competition for Standard models (wingspans of 100 in. or less), and Open (over 100 in. wingspan).

At this writing, it is anticipated that several more groups will join the soaring circuit before the season officially opens on May 5. Contestants will compete for individual meet awards, and can elect to compete for seasonal awards on a national level. Detailed information can be yours by dropping a postcard.

Bungee or Exercise Cord: Bungee, which is properly called "Shock Absorber Cord," is nothing more than several rubber strands tightly encased in a woven fabric cover. The flexible outer sheath protects the rubber strands from the detrimental effects of the elements. The design of the weave of the fabric covering material is such that, when the shock cord is put under tension, the weave spreads open, permitting all of the load to be carried by the internal strands, and not by the fabric jacket.

To determine the color of shock cord, the buyer needs to know the code system. Manufacturers weave colored strands into the fabric cover of the shock cord to serve as a date-code identifier. The code is simple and quite clever. The color of the identifier strands are changed for each year of manufacture. The color code covers a five-year period before it repeats itself.

It works like this: three colored threads are woven into the shock cord's fabric cover. Two of these threads are of the same color, and they identify the year of production. The third thread is of a contrasting color, and represents the particular quarter of the year in which the shock cord was manufactured.

While shock absorber cord is listed as Specification MIL-C-5651A, Elastic Exercise Cord (Specification MIL-C-5656) may be mistaken for it, because it is similar to the standard shock absorber cord. You can easily identify exerciser-type cord, its four-color threads differentiate it from the three-color thread of the standard shock cord. The color

code system is the same, except two colors are used to identify the quarter.

In addition to being able to recognize the difference between the two types of cords, you should know that exerciser cord is commercially used—primarily as the opening elastic on parachutes, where a shock absorption factor of low initial tension is required. Exerciser cord will test only 50% of the load capability that regular shock absorber cord is capable of taking.

Since the color code system repeats itself every five years, a close inspection of the rubber strands which make up the cord is in order. A general rule of thumb to follow when purchasing shock absorber cord (also bungee or exerciser cord) is to make a sample pull test of one or two strands protruding from the end of the cord.

SHOCK ABSORBER COLOR CODE

Year	Color of Two Threads
1969	yellow
1970	black
1971	green
1972	red
1973	blue
1974	yellow

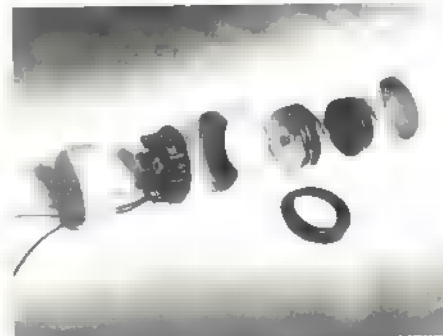
Quarter	Color of Third Thread
Jan.-Mar.	red
Apr.-June	blue
July-Sept.	green
Oct.-Dec.	yellow

SOAR NATS: (The following information was submitted by Cas Pels, 5037 N. Sawyer Avenue, Chicago, Ill. 60635, AAM's newly-acquired soaring correspondent for the Midwest and an active member of SOAR.) The fifth annual RC SOAR NATS will take place July 22, 23, 24 and 25 at Lockport College, Lockport, Ill. The contest proper will run the first three days, while the 25th will be set aside for a one day symposium. The purpose of this symposium, as defined by the SOAR NATS Committee, is to establish a united national soaring front.

Contact CD Dan Pruss, Rt. 2, Box 49 D, Plainfield, Ill. 60544 for the pre-registration package and event information.

Because the fifth annual RC SOAR NATS will be hosting the greatest number of glider enthusiasts at its location, the symposium will present an opportunity to formulate a concrete foundation upon which the future of RC soaring may rest. Agenda items will be solicited from District Soaring Advisors shortly.

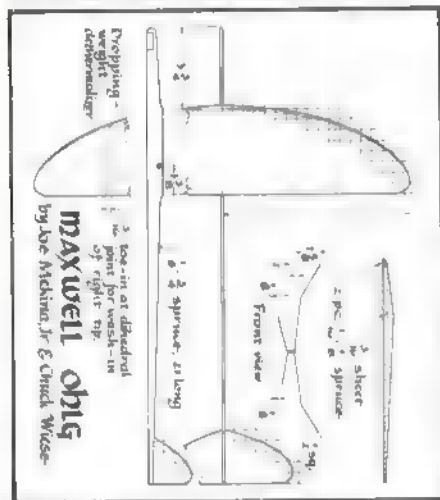
Cutting Costs: An inexpensive contact cement for sheeting foam wings is available at most Sears stores. It is called White Latex Multi-purpose Adhesive and comes in quart and gallon sizes, at about \$7. per gallon. It is primarily used for installing floor tile, and is water resistant when dry. Brushes for applying the cement can be washed in water immediately after use.



An exploded view of the GTS-1 Thermal Sensor, showing the well-engineered p.c. board (42 mounted components), and the sensing element (metallic disk), as well as the various case shells. Complete unit measures 1-5/8 x 1-5/8", and weighs 1.3 oz. For details, write Dick Jansson, 6 Pine Street, Wellesley Hills, Mass. 02181.

U.S. Free Flight Championships: Taft, California will again be the site of the annual USSF Champs, traditionally the largest annual west of the NATS. To be held over the Memorial Day weekend, May 25, 26, 27, the meet has scheduled a larger program of events than last year. Included are 1/2A through D Gas, FAI Power, Coupe, Wakefield, and Unlimited Rubber, A/1 and A/2 Towline Glider, HLG, Rocket, and Payload. Outdoor Scale events include both Gas and Rubber. Old-timer events include 02-powered, 30-sec. Antique, Rubber, and A-B-C Gas events. Added this year will be Indoor HLG, Pennyplane, and Peanut Scale (in a Category I site). And of course, there will be the traditional Night Flying event. Contact man is Jim Scarborough, Box 393, Lawndale Calif. 90260.

Maxwell OHLG: Originally designed by Charles Wiese of Detroit, Maxwell earned him third place in Junior Outdoor Hand-Launch Glider at the 1971 NATS. The design was spirited away to Ohio when Lee Campbell moved, and quickly became popular there. A modified version—the one shown in our three-view—won Junior OHLG at the 1972 NATS and Senior OHLG at the 1973 NATS for Joseph Mekina. Mekina alone has captured at least 13 first places in Hand-Launch and Catapult Glider events with the Maxwell. Full-size drawings are available for 75 cents from L and S Model Service, 9230 Independence Blvd., Apt. 118, Parma Heights, Ohio 44130.



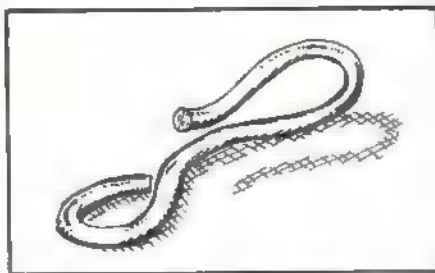
Free-Flight Suppliers List: In the April 1972 AAM, I presented a list of suppliers of free flight specialty items--items not usually available through the usual hobby supply sources. The suppliers are generally one-man garage-type operations, run more for love than profit. Since I am about to present a new list, I'd like you garage entrepreneurs to send me new lists of supplies, even if you have sent me one recently. I must have the lists by the end of April, and I will list only those who supply new lists. I cannot afford the time to make a PhD thesis out of this. Those who are not sufficiently alive to avail themselves of the opportunity for a free plug just might not be sufficiently alive to service their customers either.

Fas-Snap: That is one trade name for some little bent music wire goodies (see sketch).

Bob Critchlow first put me on to them; they are used on the pop-up-stab dethermalizer of his Zap-2 Outdoor HLG shown in the January 1973 *NFFS Digest*. More recently Steve Helmick wrote about them in the *Bal Sheet* newsletter. We read in *Indoor News and Views* that they also make good S-hooks for indoor models.

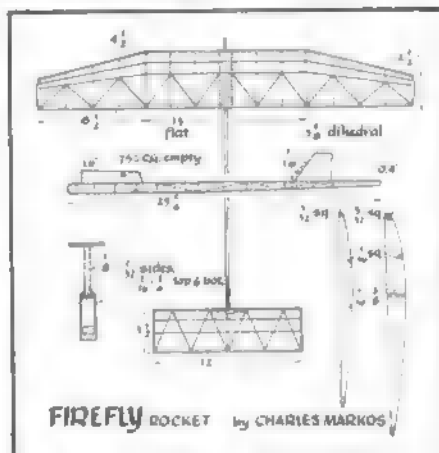
The manufacturers think they are made to go on the end of a fishing line, so you can attach and remove lures conveniently, but we know better. They are nifty for putting on the hind end of the DT line so it can easily be attached and detached from the stabilizer. And, one attached to the front end of the line makes it easy to snap on a new rubber band.

If your local sporting goods shop doesn't carry them, perhaps they will order them for you. Or you might be able to order them directly from the manufacturer. A package of six itty-bitty ones costs about 25 cents; No-



Knot Fas-Snap, Nature Faker Lures, Windsor, MO 65360. A package of ten hooks of three different sizes costs 49 cents; No. KW Snap Hooks, Weber Tackle Co., P.O. Box 47P, Stevens Point, Wisc. 54481.

Firefly Rocket-Power FF: Chicago Aeronut Charles Markos sent the following information about his Firefly: "This is the third model of ■ series, all of which flew right 'off the board' with the indicated incidence angle settings. The full-depth wing spar is necessary as previous models with smaller spars tended to fold their wings, ■ as it was being carried upwind to the launching site. The latest Firefly was set up for right turn under power and in the glide: Wash-In in right inboard panel, approximately 1° right thrust, and right stabilizer tilt (right tip high). However, it climbed to the left and made an excellent transition to the right.



"On one flight, a crosswind launch gave a right climb, but the model performed well. No rudder offset was used, but the rather large diameter glide circle indicates that a small amount of right rudder might give the designed pattern. The model weighs 2.5 oz. without fuel. Medium balsa is used throughout except for the internal fuselage bracing, which was 5 lb./cu. ft. stock. The wing and stab have two coats of Sig Lite Coat, thinned 50 percent and the fuselage has one coat."

Jetex Lives!: Last summer we heard ■ rumored that Jetex rocket supplies were ■ longer being manufactured. That would certainly put ■ damper on the AMA FF Rocket event, just at a time when its popularity seems to be increasing. I wrote to Nathan Polk of

Jetex supplies are alive and well, according to Aristo-Craft. Charles Markos' Firefly is one of the better FF Rocket designs.

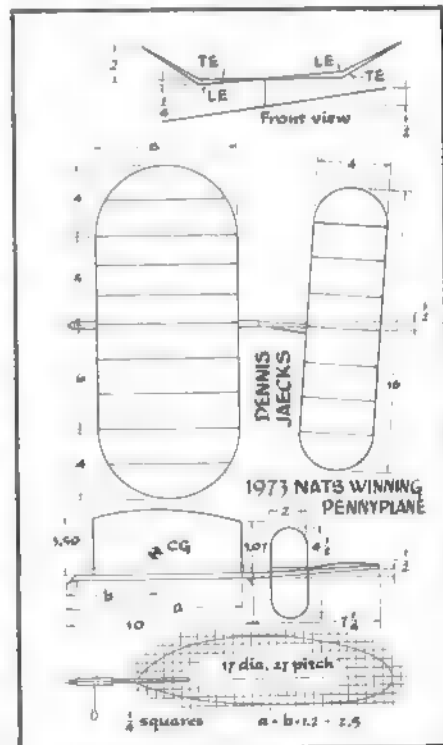


Aristo-Craft, U.S. distributors of Jetex equipment, to get the straight scoop. Polk says: "Although the British manufacturers of Jetex have ceased production for the moment, we have tooling to produce the engines on a constant basis. We also have sufficient stocks of No. 150 fuel, and wick to sell with the fuel, until our manufacturing facilities start up. I think that we will have no problem regarding fuel, wick, and engines for the 150 engine for some time to come."

Jaacks' 1973 Pennyplane: When I presented a three-view of Jaacks' 1972 NATS-winning Pennyplane, I mentioned that Dennis had observed that the model was not as stable as his narrower-chord 1971 winner, and I suggested that it wasn't the best model for a beginner to start with. Dennis reports that his 1973 NATS winner, shown in this month's three-view, is much more stable by virtue of the proper application of the CMOS method developed by Hal Crane, and popularized by Bud Tenny. Editor of *Indoor News and Views*. The CMOS method accounts for the peculiar dimensioning of the CG position shown on the three-view.

Models built from the same plan seldom have their CGs in the same position. On outdoor models, it is usually sufficient to specify the CG position as a certain percentage of the chord back from the leading edge. On indoor models, and especially Pennyplanes with their short wing-to-tail distance, two models having the same CG position in percentage of chord, will not necessarily have the same longitudinal (pitching) stability. A tail-heavy model will have less stability, and therefore should have a smaller distance from the leading edge to the CG.

By applying the CMOS method, one obtains approximately the same stability characteristics regardless of where the CG falls, provided the formula is satisfied. Hence the name "constant margin of stability (CMOS)." It might take a few trial wing locations to find the one for which the formula is satisfied.



Ribs are .035 x .055 cut to a 25-in. radius arc. Outline frame part sizes are as follows: Rudder, .040 x .040; Stabilizer, .040 x .050; wing leading and trailing edges, .055 x .080; wing tips, .040 x .055. The prop is .025 C-grain balsa formed over an X-block having a 30° tip angle. The prop blades are slotted to accept the 3/32-dia. balsa arms. The prop hub is made from six turns of tissue glued over a 3/32 music wire form. Motor stick is .025 balsa rolled around a .22-dia. rod. Tailboom is rolled over a tapered form and is .025 thick. Prop shaft is .015 music wire. The rubber mo-

(Continued on page 87)

LEW MCFARLAND ON CL

Maneuver Of The Month: First impulse was to omit what the AMA Rule Book lists as the first item under Flight Maneuvers and Scoring:

13.1 STARTING. Takeoff within one minute from the time the contestant or mechanic begins to flip the propeller. Takeoff within one minute receives full points; takeoff after one minute receives no points.

Second thoughts revealed that this little paragraph could use a little study and is worth five points, which is enough to make a difference in many contests. First, let's dig into the connotation of the words. Note: points are awarded in relation to takeoff, not for getting the engine running or having the plane rolling. Note: Judges' timing begins when the contestant (or mechanic) begins to flip the propeller, not upon the signal of being ready. Conventionally, the contestant alerts the judges by signal that he is ready for this official flip.

This may seem mundane to the old timers, but I bet that some of them miss their starting points during the coming season. Let's explore some steps that can be taken to assure NO FOUL-UPS. Check plug and battery before each official flight, either by running out a small prime before fueling, or hooking an ammeter and voltmeter into your battery setup. It is worthwhile to tighten the prop before each official flight, as wooden props often compress after a time and may loosen if the engine should backfire. Many prefer (I do) a two-volt wet cell of high amperage, along with a two-volt plug in order to improve the of starting an inverted engine. At least, DO NOT try to compete with a weak battery or bad connections. There are many other methods and/or tricks to assure good starting, e.g., the unrealistic method of inverting the plane while starting. But, most of all, have a SYSTEM which will work for you every time. As much as most of us detest the fact, don't forget that you are making an impression even this early in the flight.

Remember, we are going through the AMA Rule Book, and taking one maneuver a month, and we need your ideas and experiences as related to perfection and interpretation.

Southeastern CL Championships: The Golden Triad Model Masters (Greensboro, High Point, and Winston-Salem, N.C.) will sponsor this AAA meet June 15-16, Coded by Bill Pardue, with publicity chairman Donald Cranfill. They will be doing their part to that Stunt stays alive in the area. Both Novice and AMA



Modified Super Magician by Chuck Hora. The thicker airfoil, D-tube wing construction and variable control adjustments make for competitive performance. (Photo by Chuck Hora)

Lew McFarland and his P-38 stand-off scale stunter. Model is not designed for competition.



Where the Action is columns are what you readers are doing, making, or flying. Support your columnist with articles, photos, and ideas. Sketch your next gadget. We'll draft it for presentation. Each item earns you a \$5 bill. Submit to the writer, c/o AAM.

Stunt will be offered. What is hard to believe is that the contest and practice area is 12 acres of smooth asphalt. Looks like that is where we can find a lot of "action," so plan to be there—we hope to.

Ideas With Reason And Results: This would be a good way to describe active stunt flier George R. Higgins III (21 Edison Park, Apt. 2, Quincy, Mass. 02169). To quote one of his ideas: "One of the biggest problems that seems to plague stunt fliers (especially FAI, where maximum flight time allowed is 7 min.) is the proper duration of the motor run."

(Continued on page 98)

DON LOWE ON RC

The New And The Novel: Word received from my good friend Ron Van Putte of Shalimar, Florida, indicates that the Eglin Aero Modelers will host a pattern and scale contest this year. This first-time affair will be called the Jim Kirkland Memorial RC Contest, in honor of the late Jim Kirkland. The dates for the contest are July 5 and 7, and the site is the club's regular flying area, which is one of the Eglin AFB auxiliary fields; namely, site B-2 (Field 4).

The events will be Class A, B, CN, CE and Stand-off Scale. Knowing Ron pretty well you can be sure that guys will work mighty hard to put on a good contest. For further info., contact Major Ron Van Putte,



The Laurel RC Club of Uniontown, Pennsylvania, has a strong membership of 23. A new and active group.

Chris Christman checks his flight status, while Asst. CD Herb Foster looks on. The Shulman System of flight processing enabled six events to be flown in one day. (Photo by Leon Shulman)



12 Longwood Dr., Shalimar, Florida 32579.

Also, word just in from the DC/RC Club of Washington, D.C. indicates they plan to again host their annual affair. This year, it will be the Fourth Annual DC/RC Aerobatic Meet, to be held June 22-23 at Dahlgren Naval Weapons Center, Va.

These guys are innovators and will be using the unique qualification system which they used last year. The system consists basically of everyone flying two short qualifying flights. These consist of three loops, three rolls and a stall turn. The top score for each maneuver out of both flights will determine placement into five finals classes. The classes will encompass a spectrum of pattern difficulty, using maneuvers from the AMA/FAI schedules. For example, Class I will consist of 12 maneuvers, while Class V will feature six maneuvers. It's just another way to categorize competition on the basis of skill level. It should be interesting.

Let There Be Gas: Contact with a number of contest organizers around the country indicates that most of the annual traditional contests are again being planned this year. This is in spite of the very real threat of not having adequate automotive fuel supplies to make the scene. Since CDs must plan months ahead, the consensus seems to be optimism that somehow the fuel problem will be resolved in time for the contest season. Our Dayton, Ohio, group is taking the same view, and is planning its 12th Annual Wright Brothers Memorial RC Championships. We figure that if we're really strangled by fuel shortages in

(Continued on page 96)



Pattern Expert winners Jim Martin (foreground) and Bob Violett (first and second places) examine some of the prizes they won at the Eastern States RC Championships. Some \$3900 worth of prizes were split among the 59 entrants. (Photo by Leon Shulman)

Bill Hinnant (Arlington, Va.) checks out his Ross-powered ship, while Lou (back to camera) shows off his new to the other contestants at the Eastern States Championships. (Photo by Leon Shulman)



FAKIR I

The Fakir (named after Hindu magicians) is a pattern machine with very little trickery, but capable of producing extraordinary (almost magical) results. / by Howard C. Mottin



FAKIRI

The February ('73) issue of **AAM** contained the announcement ■ a Super Design Contest, based on the drawings of Bob Lopshire. The bottom view of the Fakir was on the cover of the Doylestown World Championship program (also on the October '71 **AAM**) and the top view appeared on the cover of the February '73 **AAM**. Using the rules for the contest as ■ guide, I created the idea of the Fakir-I. The contest called for the plane to be designed on paper first and then constructed according to those drawings. Finally, the rules required that the flight characteristics be demonstrated by appearing at the '73 NATS in Oshkosh.

The primary objective of my particular design approach was to create ■ plane that would have good flight characteristics. Many pattern aircraft are developed through a build-and-crash procedure, often encompassing several years. In this way, the bugs and design deficiencies are eliminated one by one, until an optimum craft is achieved. Because of the time restrictions imposed by the contest, this was impossible; so the next best thing was to model the plane according to existing designs of known flight quality.

The first step in the design procedure was a dimensional analysis in order to arrive at the overall configuration. Current design trends in pattern planes decree that their weight is between seven and eight lb., with wing areas of around 650 sq. in. The overall configuration of the plane was dictated by Bob Lopshire's drawing in **AAM**. This, then, was the basis for the design, with each component defined by experience and the state of the art analysis.

DESIGN THEORY

Wing: The wing is the most important single feature of a pattern design. A goal of seven lb. total weight and

■ 650 sq. in. wing area gives a wing loading of 25 oz./sq. ft. This is on the heavy side, but about standard for the top pattern design of today. The wing planform with ■ straight trailing edge and swept-back leading edge, is dictated by the **AAM** drawing. Aspect ratios have traditionally been between 5:1 and 6:1, with the higher ratio being more stable about the roll axis, and having better turn and spin recovery characteristics. A wing design I have evolved through the years has a 5.7:1 aspect ratio.

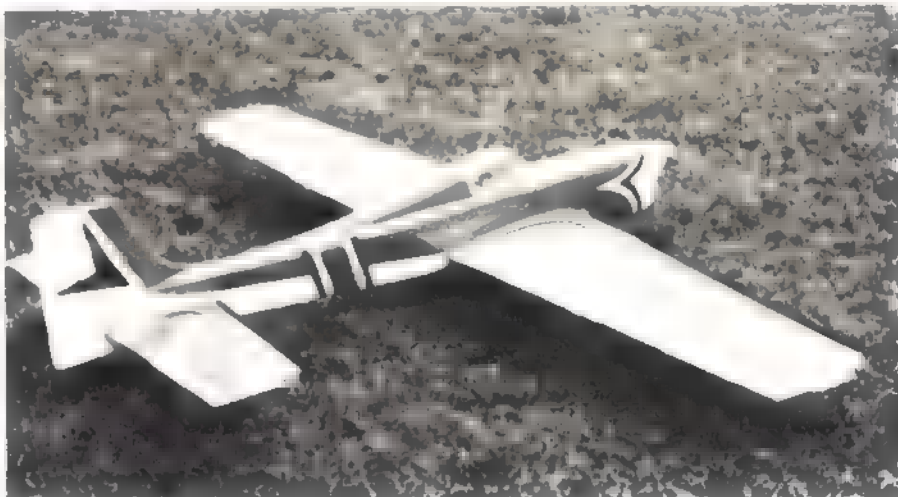
This design must incorporate inset ailerons. Using ■ figure of 11 percent of wing area, I arrived at an aileron area of 70 sq. in. The current trend of using torque tubes eliminates the bellcranks and pushrods in the wing, and also satisfies the contest requirement of no exposed linkages. The original design called for ■ 1/8" dia. torque rod, but this had too much flex, and ■ replaced with a Rom-Air torque rod unit.

The next important selection is that of airfoil. Through the years, hundreds of different airfoils have been tried, and many have been claimed as the optimum for RC. Currently, the symmetrical sections are the most popular, with

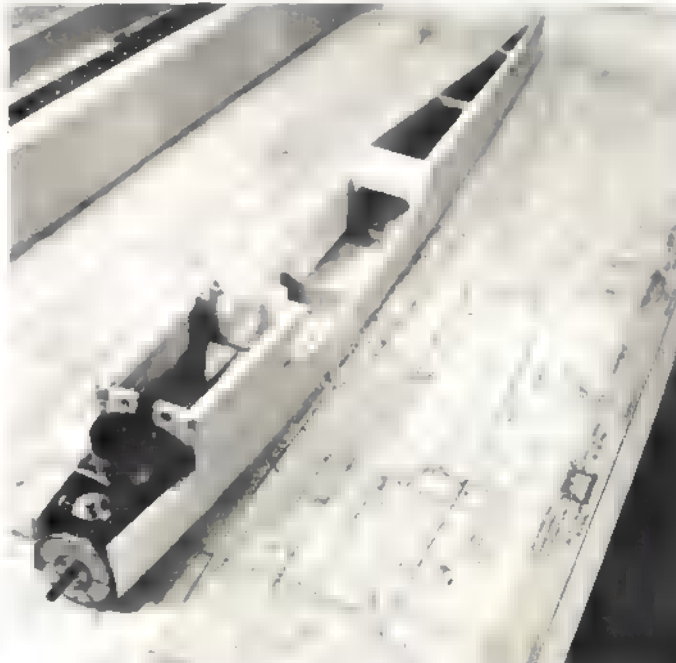
15 percent thickness just about the standard. Because this was to be a highly tapered wing, some method had to be employed to prevent tip stall. Dismissing wash-out, there are three common methods to prevent tip stall: (a) increase the thickness percentage at the tips; (b) maintain a constant large leading edge radius; (c) gradually change the tip to a slight lifting section. Point (b) was used in the design of this wing.

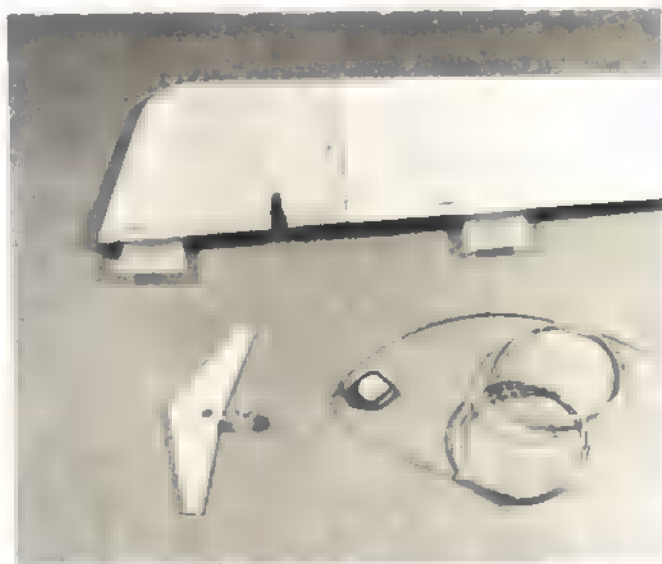
Incidence and dihedral complete the wing analysis. The 0-0 setup is the standard of today. I like to design my wing to be 1/32" lower at the trailing edge, just to insure that the wing does not end up negative. For all practical purposes, this is still a zero incidence design. The current trend is also toward zero dihedral. I prefer one in. under each tip, just for appearance's sake. With the swept-back leading edge (the sweeping giving effective dihedral), this probably figures out to be about 2°. In summary, the wing was designed to the following dimensions:

Wing area	650 sq. in.
Root chord	13 in.
Tip chord	8-3/8 in.
Wingspan	61 in.

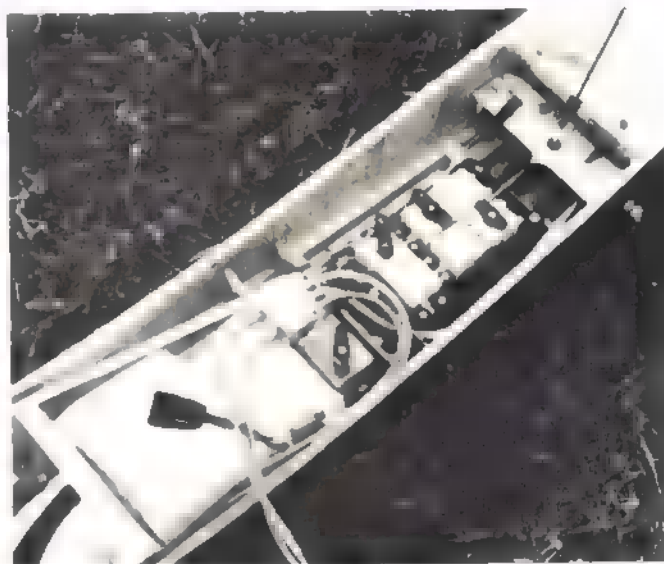


ABOVE: Fakir's wing core ready for sheeting. Wheel wells, gear anchor plates and LG channel have all been premeasured and cut out. RIGHT: Fuselage builds, like most pattern ships, inverted on the boards. All bulkheads have been fitted and the engine is aligned for proper thrust angle. Plywood template nose ring slips snugly over the engine bearing to ensure proper centering of nose cone.

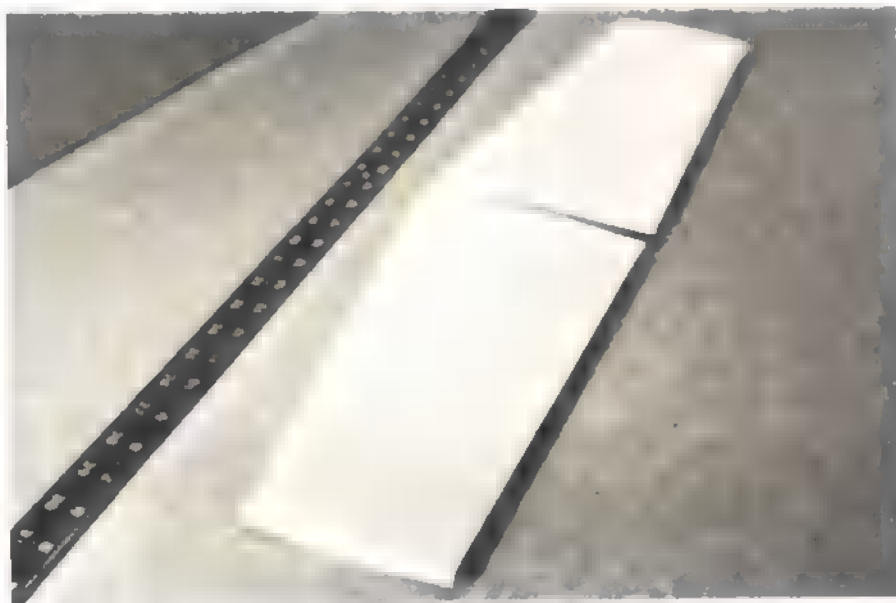




Rudder and its linkages. Note chord-wise grain of the hard balsa which forms the lower third of the rudder. $\frac{1}{2}$ A bellcrank and braided cable—the way they rigged linkages — antique full-sized aircraft — very positive control setup.



The radio compartment of the Fakir is well thought out. Pneumatic actuator valve is secured to the top of the retract servo. Arrow points to nylon bellcrank on platform, to which is connected the rudder linkage



Stab cores ready for covering (above), and the complete job (below). Finished stab is already resined before assembly to the fuselage



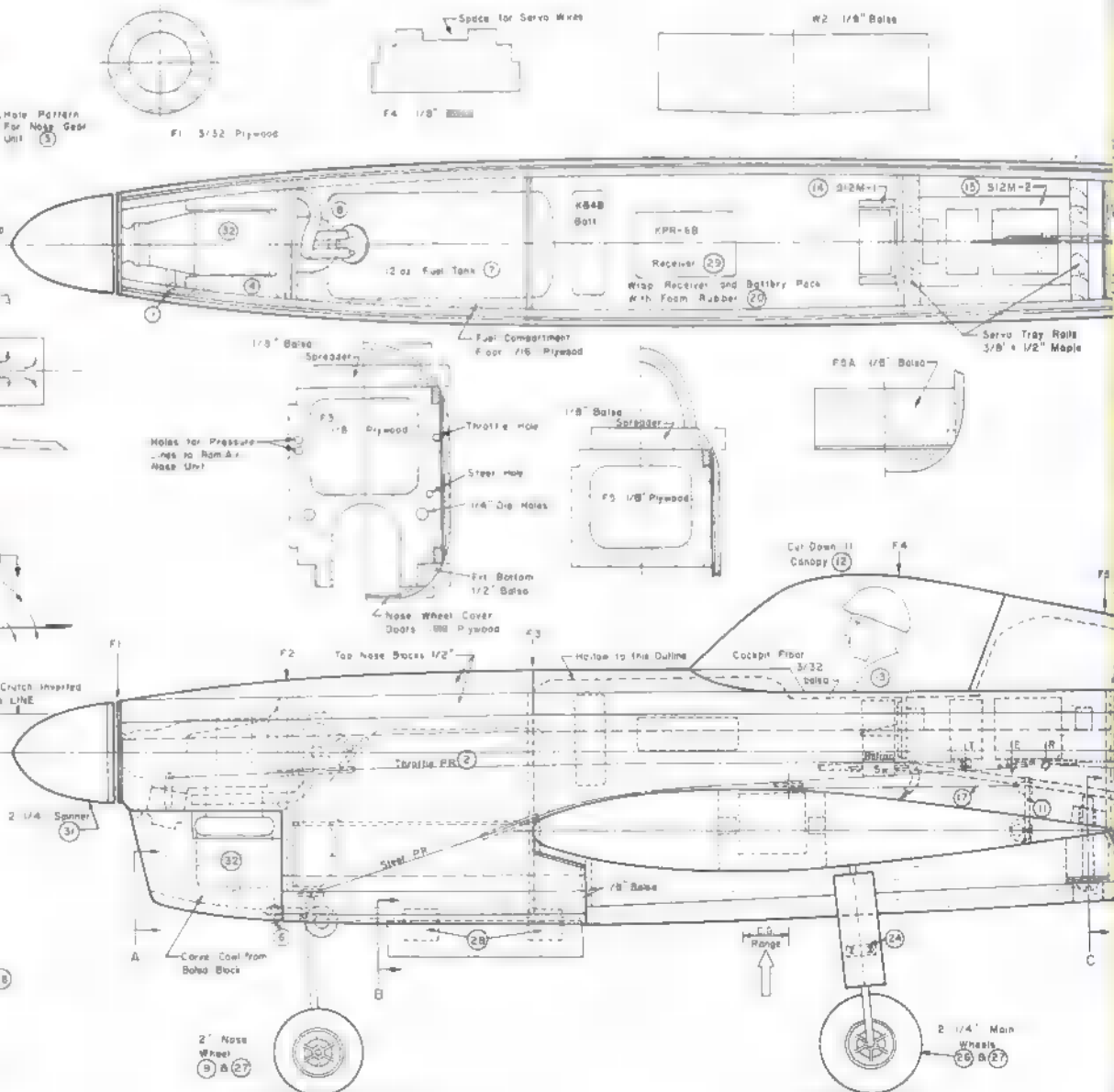
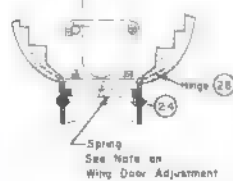
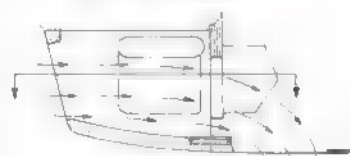
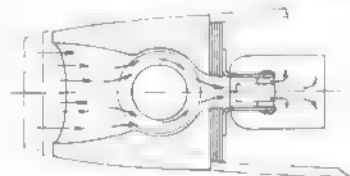
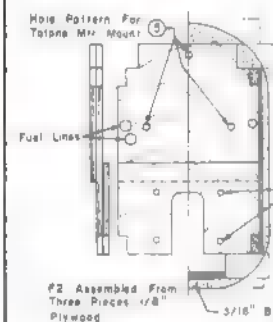
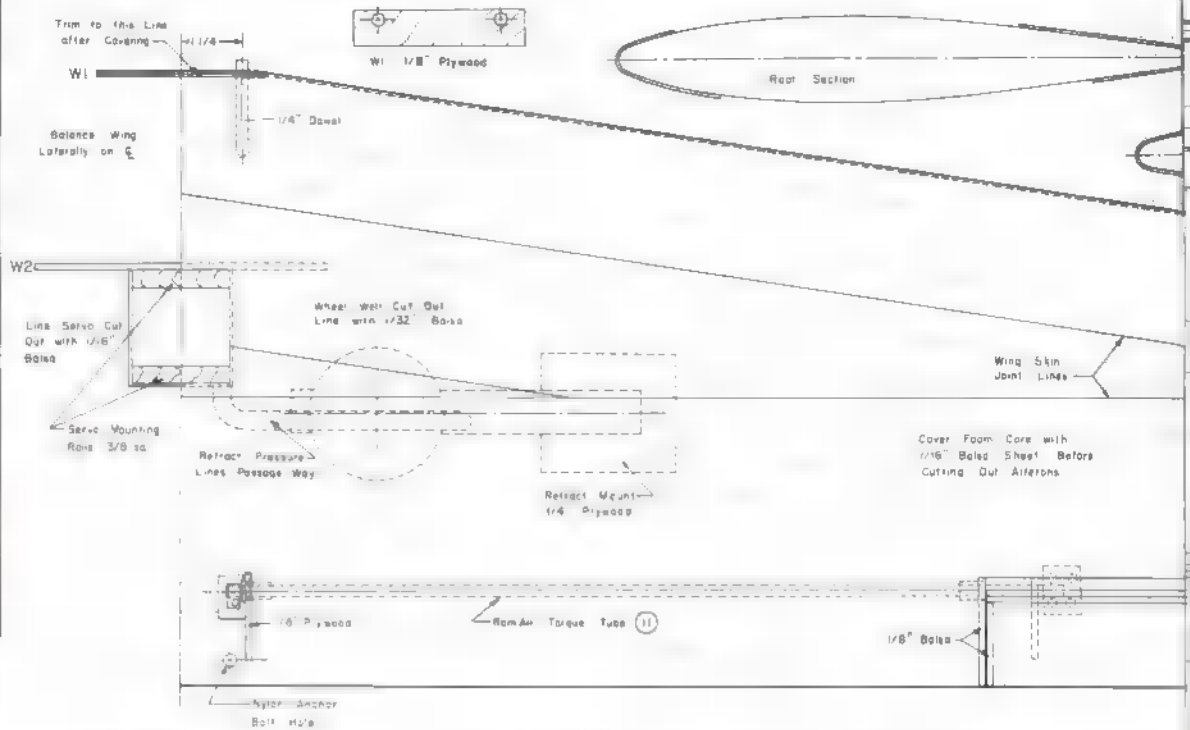
Aspect ratio	5.7:1
Allerons	70 sq. in. (11% span width) ($2\frac{1}{2}$ = 14")
Wing loading	25 oz./sq. ft.
Zero incidence	
Slight dihedral	

Stabilizer: Stabs are usually in the range of 20-25 percent of the wing area. I have always preferred the larger percentage because I think it flies better. With a 650 sq. in. wing, this figures out to be 160 sq. in. A 4-1 aspect ratio defines the plan of the stabilizer. Allowing 20 percent for the elevator gives a $1\frac{1}{2}$ in. wide elevator. To match the wing shape, and AAM drawings, the stab has a swept leading edge. Since we've gone to the trouble of cutting a foam core for the wing, we might as well use one for the stab. This results in a nice airfoil shape, which most designers feel is more efficient than a flat stab. I settled on a $\frac{3}{4}$ " constant thickness stab for several reasons. One is that it is very easy to build straight on a flat table and, secondly, it is easy to align correctly when gluing to the fuselage. I suspect that it might have some aerodynamic improvements also. A Midwest metal control horn is used, and is enclosed in the fuselage, as per the AAM requirements. This also results in a very clean tail, without the drag from that wire bird cage sticking out in the wind. The stab then figures out thus:

Span	25 in.
Root chord	$7\frac{1}{2}$ in.
Tip chord	$5\frac{1}{4}$ in.
AR	4:1
Total area	160 sq. in.
Elevator area	37 sq. in.

Fuselage: Most fuselages are designed rather arbitrarily around the equipment they must contain. The general shape of this fuselage is already determined by the AAM drawing. There is still quite a bit of latitude as to what moments to use in the dimensions of the fuselage. The nose length is determined by the engine, fuel tank and nose gear retract unit. This usually turns out to be around 10 in. but, for this design, it was reduced to $9\frac{1}{4}$ in. for two rea-

ITEM		LIS. OF		HARDWARE		
NO.	QTY	SER. NO.		PART		MFG.
1	1	M52		Mini-Song		GOLDBERG
2	1 PK	GRT 36		Gold n/Pushrod		Sullivan
3	12	M8440		Bolts		Du-Bro
4	1	605		Engine Mount		Idolone
5	3	M8632		Bolts		Du-Bro
6	1 PK	M8348		Bolts		"
7	1	65-12		Fuel Tank		Sullivan
8	1	PT-1		Fuel Tubing		Du-Bro
9	1	2"		Nose Wheel		"
10	1 PK	21		Nylon Hinges		Rock City
11	1 Set			Torque Tube		Rockwell
12	1	C4C		11 Canopy		Du-Bro
13	1	8C		2" Ruler		W.H. Bros
14	1	S2M2		Aluminum Bracket		Kroft
15	1	S2M2		Servo Tray		"
16	3	AGH5		FG Pushrods		Sullivan
17	3	BL1		Snapper W/Rock		Goldberg
18	2	SLD		Spider-Kwik Unit		Du-Bro
19	2	23-9		1/4" Nylon Bolts		Ace
20	1 Pkg.	1/2"		Foam Rubber		Sig
21	1	CM2		Small Horn		Goldberg
22	1	Q29		Elevator Horn 4		Midwest
23	1	SQ4		1/8" Music Wire		X 85
24	2 PKs	M8348		Bolt Set		Du-Bro
25	4	10-10		Landing Gear Clips		Midwest
26	2	225R		2 1/4" Wheels		Du-Bro
27	1 Pkg.	DC-532		Controls		"
28	1	H6		Nylon Hinges		"
		Misc		Parts		
29	1	3PR-6B		Radio		Kroft
30	1	KGR5		Retract Gear		Hot & F
31	1	2 1/4"		Spinner		Fox
32	1	1020		Engine		West



FAKIR I

sons: (1) the shorter nose lessens the effects of engine torque in certain maneuvers; (2) the swept wing would further increase the adverse effects of a long nose. A standard 48-in. sheet of balsa for the fuselage side permits you to lay out the rest of the fuselage according to the following formula:

Nose	9 1/4 in.
Wing chord	12 3/4 in.
Stab chord	7 1/2 in.
Tail	17 in.
Rudder	3 1/2 in.

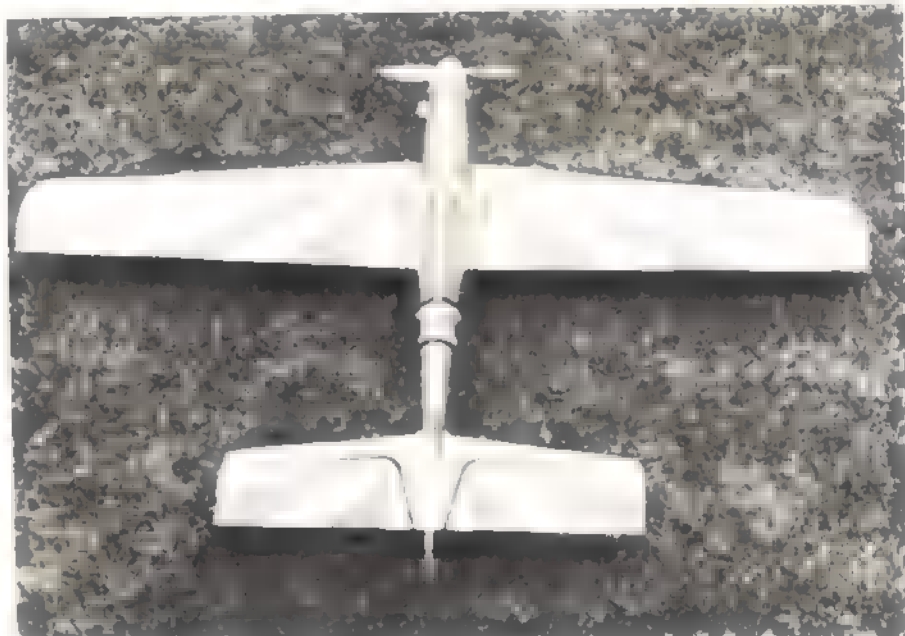
Total 50 in.

This arrangement gives a tail moment arm of 27 in. which is close to a 2:1 ratio. This is a very good force arrangement. The placement of the wing is critical in this situation, in order to allow room for the fuel tank and the retracted nose wheel. The wing chord centerline was placed 1 3/4 in. below the thrust line for this reason. The bottom part of the fuselage was extended back, past the leading edge of the wing, to enclose the wheel well. This will also serve as a key for locking the front of the wing securely in place.

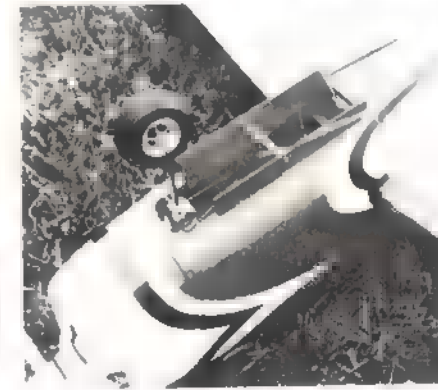
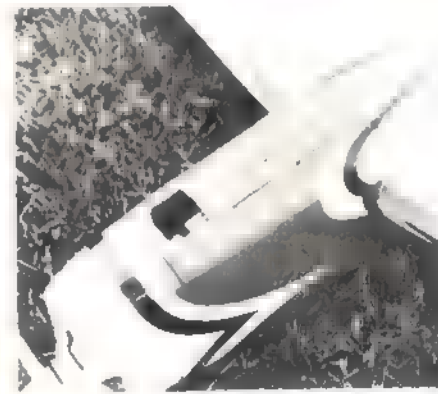
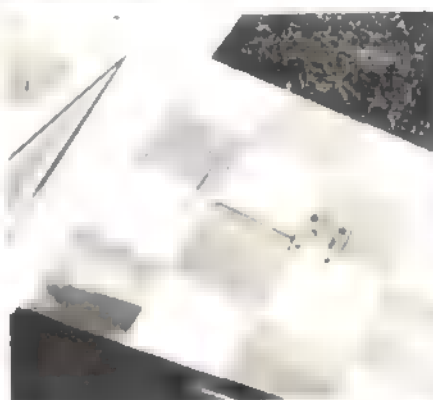
With an inverted cowed engine, cooling could be a problem. Rather than just stick the engine cylinder in a large cavity in the interior of the cowl and hope for the best, a pressure system of cooling was used. This worked well in control line, and should work in RC, too. The cowl interior is formed to force air through the cylinder fins, and exits through a hole in the fuselage bottom under the retract unit, ahead of the wheel doors.

The fuel tank will be located above the nose gear and, because of this high location, will require the use of a pressure feed system. The easiest method is to use muffler pressure to maintain a constant head. This is a low pressure system, but it is enough to give a good constant engine run throughout the flight. The remaining point to be designed into the fuselage is the fin and rudder. Most of the current top designs use a 25 sq. in. rudder, and about a 30 sq. in. fin. This gives good yaw stability and enough control for the Figure M and spin maneuvers. To maintain a good profile configuration, the final design figured out to be a 34 sq. in. fin and a 25 sq. in. rudder. Normal RC design practice dictates that the CG should be located at one-third of the mean aerodynamic chord. From practical experience, this can vary from 30 to 40 percent of the chord. This CG range is shown on the fuselage profile drawing as a point to shoot for. The final weight of the plane is 7 lb. 2 oz., and the CG came out at 33 percent.

Two prime features make this design unique: a completely cowed engine, and wheel doors covering the retracted landing gear. The cowed engine caused some concern because of the tendency of these large bore RC engines to overheat. Hot humid days and mufflers seem



Top view of the Fakir I shows its low drag fuselage and pleasing moments. Short nose moment is more obvious here.



(Continued on page 93)



FAKIR II

Mottin and Lund were neck and neck down the straightaway (they both captured the essence of the Super Design Contest), but Fakir II was edged out by a nose (spinner?). Here is a look at the "other" winner. / by Bruce Lund

Text condensed by Patrick H. Potega

The Fakir II is a composite of what a fine RC pattern ship should be. I gathered data from most of the popular designs in use today. Averaging their areas and moments, I put all the data into a bag, shook it up and came out with:

Wingspan	62 in.
Wing area	679 sq. in.
Length	51.5 in.
Nose moment	14.5 in.
Tail moment	31.25 in.
Stab area	177 sq. in.
Rudder height	9.375 in.

The wing layout and airfoil are the same as Don Coleman's Cutlass Supreme, but with barn door ailerons ala Banshee. The stab is Tiger Tail. The nose moment is the same as the Super Kaos, Banshee and Tiger Tail. The tail moment is close to the Mach I. From all this, I assembled a plane that was to look like the original contest art work.

Here are some hints that I used to build the Fakir II.

Wing: When ready to sheet the foam core, apply the Southern Sorghum and, while it is setting up, mix a batch of Sig Epoxolite. Apply it to the trailing edges;

then sheet the wing. Squeeze the TE together to force out excess Epoxolite. The TE will thus be firm and can be sanded out easily. Always sheet the cores in their original blocks.

Fuselage: True to form, this fuselage builds just like a Cutlass. Everything is pinned upside down flat on a board, with the nose hanging over the edge of the building table. The top of the fuse is a composite construction using sheeting and hollowed blocks. The nose cowl can either be hollowed blocks, as I used, or fiberglass molded. The Hobbypoxy balloon method works well.

Stab: Tiger Tail construction works well here. The LE is a balsa strip approximately 1 1/4" wide, with two vertical slots bandsawed to the width of the rib LE. Pin this piece to a board, shim up the TE, then glue the ribs between. The top sheeting is then applied, with the front edge sliding into the bandsaw slot. Unpin, flip and sheet the other side. The elevator has a spruce TE.

Rudder: An entirely new method of building the rudder was tried on this model. Cut a piece of Pro-foam to the size of the rudder core. Thickness must

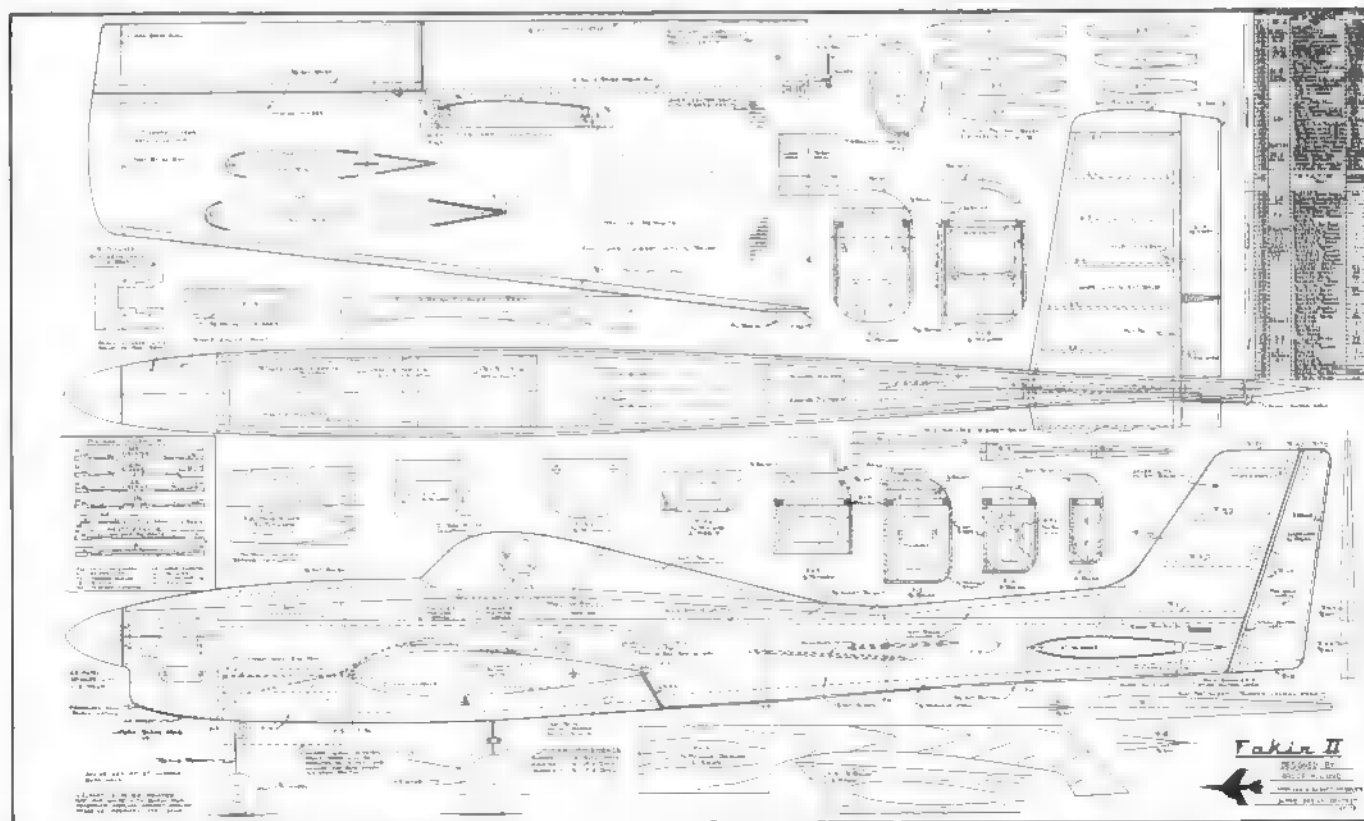
be at least that of R-6. Glue R-6, 7 and 8 to the foam. With a sanding block, sand the foam down to the balsa. This will yield a perfect core to which to bond the 1/16" skins. Add the 1/8" sq. spruce trailing edge.

I have found Skyloft (Southern Products) to work very well. There are a few simple rules to observe. Use it only on flat surfaces, like wings, stabs, etc. Soak it in water for several minutes, don't just wet it—it takes time for the nylon to expand. When applying it, be careful not to stretch it. Secure each panel with a one-in. doped strip on all edges. Do not get any dope on the edges until the rest of the panel is doped down. Reactivating the dope along the edges will cause it to lift and wrinkle.

The fuselage is done in traditional silkspan. Seal the entire model with dope, then apply automotive primer. Appliance white is available in most large auto paint stores. Use Flex-all plasticizer (again, Southern Products) in the primer coats to prevent cracking. The final color is Martin Senour acrylic enamel, used with an appropriate catalyst. The catalyst makes the enamel fuelproof. How all those checkerboard squares were applied is another story, which I won't get into here.

I hope that the ideas I have presented here will help those who build a Fakir from Howard Mottin's plans.

Mr. Lund's article is condensed to present the most significant ideas of his design. Plan Service is not available for the plan reproduced here. Further hints and ideas from other Super Design Contest entrants are in the Model Technique section of this issue.



SPORT

Bug Revisited



The Rudder-Bug bites again! Dr. Walt Good's original design is right at home with today's intermediate fliers or sport buffs. Story begins on following page. / by Gabriel Bedish



Photos by the Author.



TOP & ABOVE: The lines resemble those of many contemporary trainers. Simple paint scheme adds flavor to the design. BELOW: Author holds digital three-function version of the Bug. By anyone's standards, the Bug is not a small compact in size.



"The Royal Rudder-Bug" is an extremely easy to build rugged radio control design. . . . Designed by Dr. Walter Good, one of the countries [SIC] best Radio Control flyers, you are assured of an all around performer." Thus read the introduction to the Berkeley kit of 1954. The claims weren't very startling then (and still aren't); yet the model finds itself in vogue even today as a practical sport model. The Bug, like the automobile which shares that nickname, is a design that time has not withered, nor custom staled.

The model presented here is more than an update of this trend setter. It's yesterday's excellent engineering made painless by today's construction techniques. It's ironically ahead of its time, because it fills the need for a large, it-will-last-forever weekend flyer. Now, as then, it is a plane that doesn't disappoint. It's as sport modeling as Sunday.

True, it was a contest design in its own day. With a Berkeley Super Aerotrol rig (in the days when kit manufacturers made radios, as opposed to today's converse situation) it was very competitive as a rudder-bug (more bug than rudder, usually). The later R.E. Varicomp miraculously gave rudder and elevator, and the Rudder-Bug became a multi. The final stage of this evolution occurs 20 years later—the Bug can now be built with full house.

This is, by no means, a small model. Except for the surprisingly light weight and minimal power requirements, the original design had the dimensions of today's pattern ships (after all, it was a competitive aerobatic design).

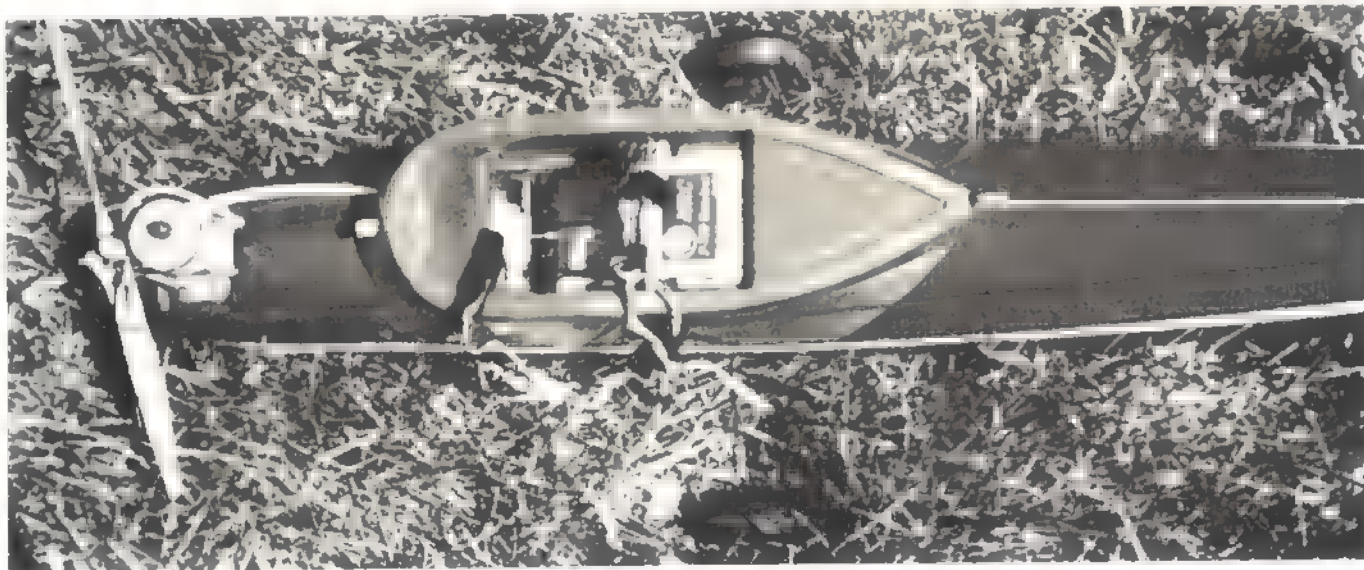
Wingspan	62 in.
Wing area	600 sq. in.
Fuse length	42 in.
Engine	14-23
Weight	4 1/2-5 1/2 lb.

The revision presented here has a slightly increased vertical tail, and a tad more length in the fuse behind the wing. Today's 29-35 engines seem the best for current flying styles.

One major revision has been tolerated in this twentieth anniversary version of Dr. Good's design. The airfoil has changed from the original Clark Y to a somewhat unorthodox U.S.A. 27 (that's right, folks). The efficiency of this airfoil will really surprise you, especially with the light wingloading. The unobtrusive and predictable stall characteristics of the flat-bottomed wing are retained. You'll be amazed at what this airfoil can do for duration. If you wish to build the model as Berkeley, simply draw a straight line along the bottom of the rib patterns.

Our prototype revised Bug was flown rudder only with an Orbit single-tone system on 27.225 MHz. A McCoy 29 rounded out the package nicely. The original had an inverted engine, but we opted for sanity over absolute replication. Even with only rudder function, the model still shows its competition breeding, and can be quite the stunter with adequate control throw.

The plane will fly very well on any combination of controls, so it makes a good vehicle for any radio (it may be a bit much for pulse). Rudder/elevator/motor was our favorite mode, although



Digital installation is compact, but certainly not cramped.

ailerons do add some class (not much of a roll rate, but lots of class). A cheap and dirty way to get the best of all possible worlds is to install all the servos; then unplug the necessary servos to get the flight mode you want at the moment. Flying it on the same day in each of the four configurations will add to the appreciation of this classic's outstanding flight characteristics.

CONSTRUCTION

It would be nice to say, as did the Berkeley kit, that the model is "extremely easy to build." Twenty years ago, the relative meaning of "easy" was different, perhaps. The skills required are basic; however, you can't get old-timer looks without putting a lot of little sticks under the covering. The external appearance of this model should definitely be considered "organized lumpy," especially along the leading edge of the wing. So put all those little pieces of wood in. Here are a few guidelines to help make sure that all the lumps wind up organized.

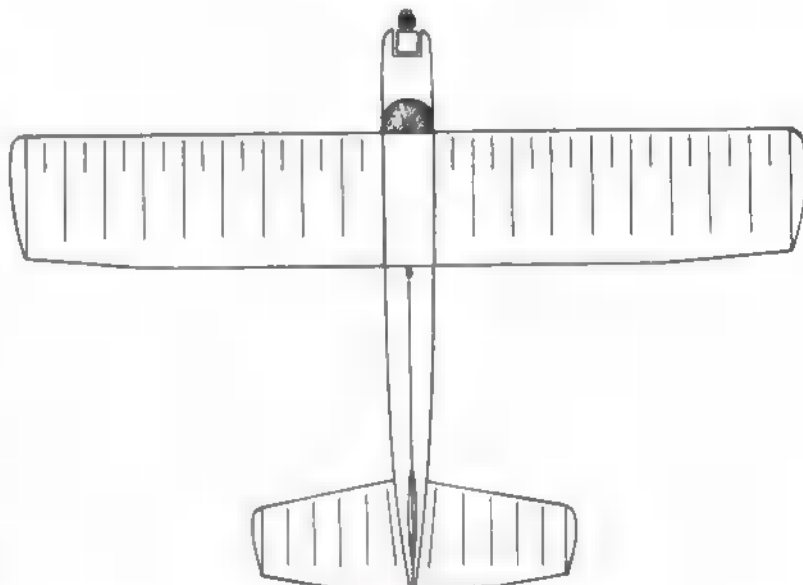
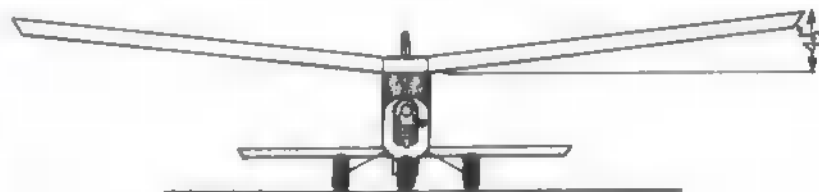
Wing: Build the outer panels first; then build the center section (the three WC ribs). The center section should incorporate the WD dihedral braces. Attach the outer panels by sliding them onto the prongs formed by the dihedral braces.

Fuselage: Don't panic—it's built flat on the boards. The $1/4 \times 1/2$ " longerons are overlaid on the top view, with the $1/2$ " sheet cabin floor and the $1/4 \times 1/2$ " cross braces positioned accordingly. Then glue on the top section of each former, build up the cabin area, and add the $1/2$ " sq. top stringer. Unpin this assembly from the board and add the corresponding lower formers and bottom sheet. Round out the fuse with the $1/4$ " sq. false stringers. Install the firewall and engine mounts and it's done.

Empennage: The only thing to note here is the obvious deletion of an eleva-

Text Continued on page 101

Plan on page 56



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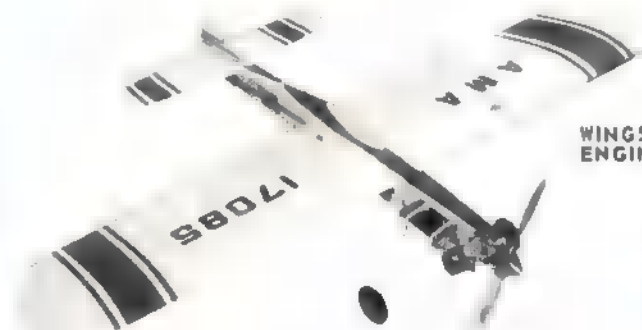
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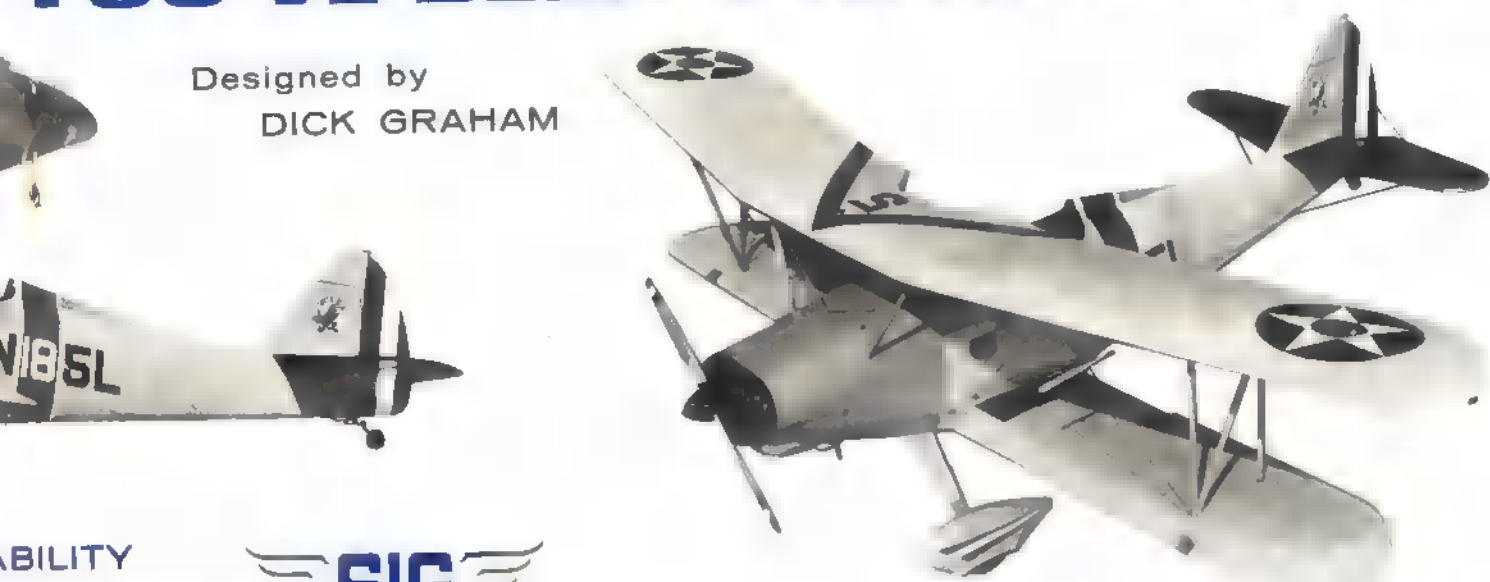
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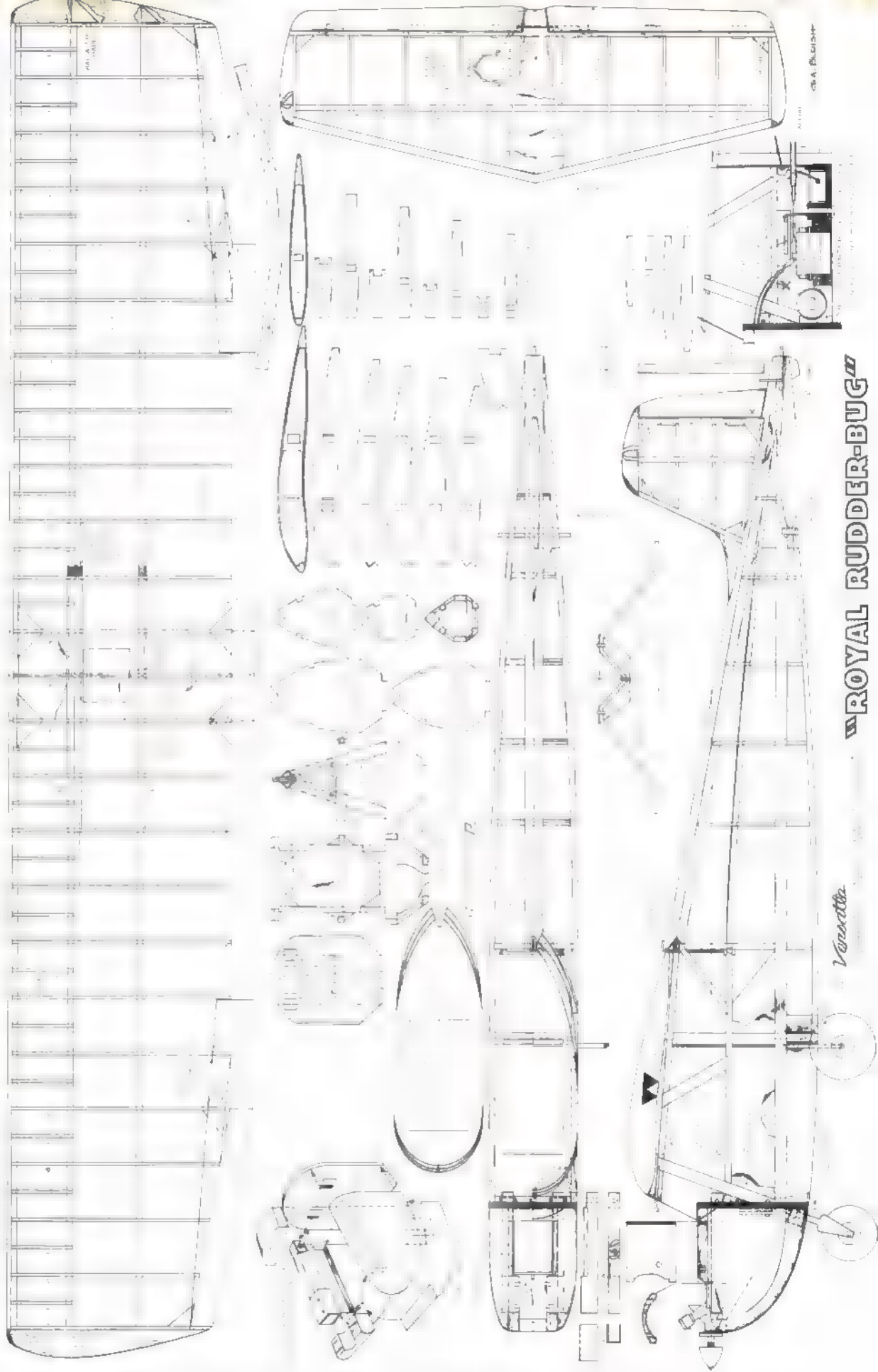
WING SPAN: 57"

ENGINE: .45-.60

LENGTH: 45"

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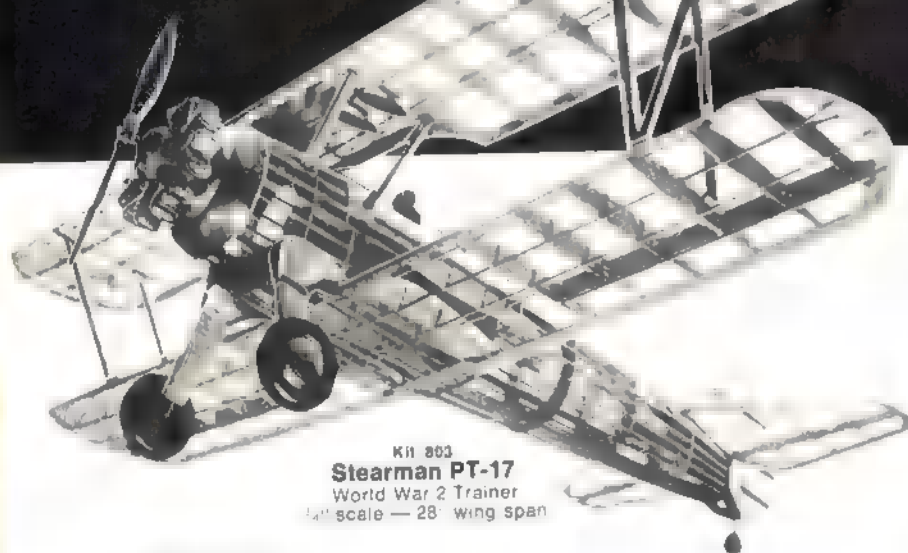




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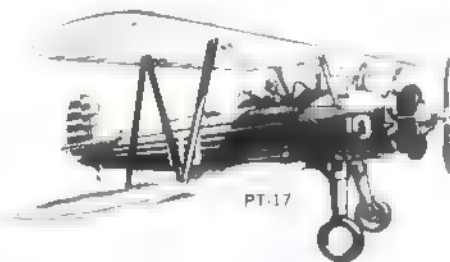
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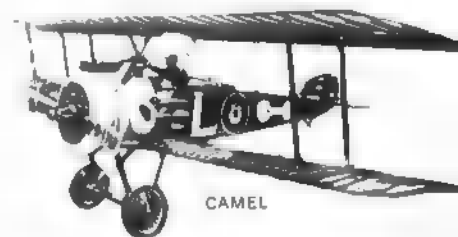
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PT-17



CESSNA 172



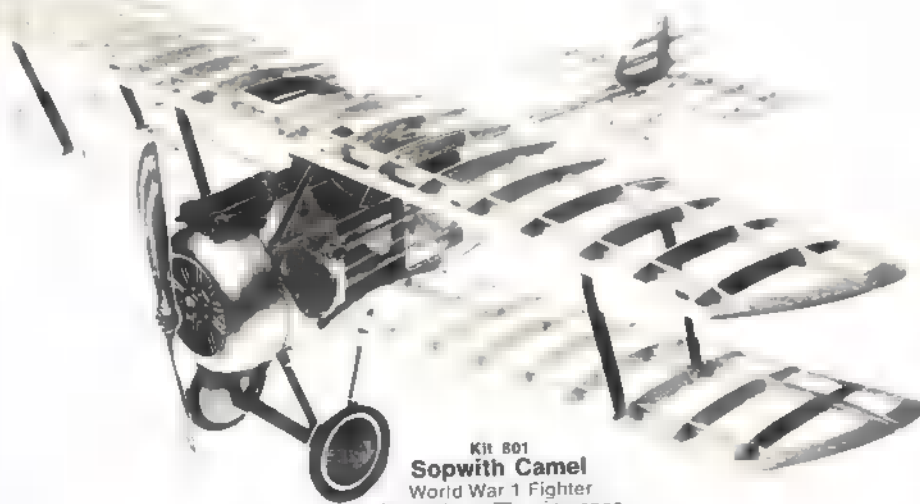
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Kit 801
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getting started in R/C

SIXTY-EIGHTH IN A SERIES

INTERFERENCE AND YOU: A GLITCH IN TIME

JIM McNERNEY

One of the more frightening experiences in RC is the time, however momentary, when your airplane displays a will of its own. It may just be a slowness to respond to your commands. Or it might be a sudden roll on final, a sharp turn at high throttle into the pits, or that most horrible moment of all: a rolling, twisting, high speed dive to a six-in. crater. Why did this happen? You laid out a small fortune for the equipment. You assembled it carefully and well. You gave it a thorough checkout. The batteries were freshly charged. What went wrong?

Of course, you could have been the victim of a loose or broken wire, a cracked component that came unstuck with vibration, a suddenly failed power cell, or a mechanical failure. However, let's for a moment assume it was none of these (although about 80 percent of the crashes we've seen can be traced to one of these causes). There is still another phenomenon responsible for partial or complete loss of control. This phenomenon will, for our purposes, be called interference. Now, before you run down the street and strangle the kid with the walkie-talkie, let me explain what I mean by interference.

Although they are invisible, the air is literally saturated with various kinds of electromagnetic radiation (radio signals). In fact, in some areas of the United States, there is a problem of electronic pollution. Your transmitter adds to this mass of signals. There are large TV and radio stations putting out thousands of watts of power; there are satellites and microwave relay stations, radar, aircraft, taxicabs, police, power company crews, amateurs, CBers, etc. Your transmitter puts out less than one watt of power, usually less than half a watt. Your receiver, up there in the midst of all that chatter, must be able to sort through it and "listen" to just your transmitter. It's getting tougher all the time. As the various frequency bands become more crowded, allotted operating frequencies come closer together. Then we have phenomena known as harmonics and image frequencies, which add to the problem.

Years ago, we were able to get by with super-regenerative receivers. These receivers could be made fairly sensitive, i.e., they could pick up weak signals, but they were broadly tuned. Broad tuning means that not only the trans-

mitted signal is picked up, but signals adjacent to it in frequency are also received. These other signals could be filtered out pretty well in a reed decoder. However, in digital systems, the adjacent signals create mass confusion in the receiver.

So it was necessary to go to super-heterodyne receivers. This type of receiver added a crystal controlled local oscillator and more tuned stages to narrow the range of frequencies to which the receiver would respond. Even this type of receiver has proven to be too susceptible to transmissions in some areas. An even more sophisticated type of receiver has been made available in recent years. This type is known as a dual conversion receiver. It has two crystal controlled oscillators, operating at widely separated frequencies, and many more stages of tuning.

There are still some places in the country where you can operate a "regen" receiver if you're all by yourself. In most places you must operate a standard "superhet" receiver. But there are many places where you must have a dual conversion receiver to operate on some of the Citizen Band frequencies.

The characteristic of the radio that we have been discussing is its selectivity. Now we'll talk about sensitivity. In order to do that, we need to get a feel for signal-to-noise ratio. The signal goes through many stages in a receiver. At each stage where the signal is "worked" (i.e., filtered, modulated, detected, etc.), it loses strength. There are impedances to it caused by the various resistors, capacitors and inductors through which it passes. Therefore, the signal must be amplified at various stages. We used to do this with vacuum tubes, but now it's done with transistors or integrated circuits. Any distortion of the information in the signal (i.e., anything that changes the shape or "meaning" of the signal) is noise. When the signal is amplified. If the noise becomes too strong with respect to the signal, the receiver will put out bad information to the servos.

Noise can come from several sources. It can be generated in the transmitter by such things as a defective stick potentiometer. It can get into the receiver, via the power supply, from a defective servo motor. A bad capacitor, designed to filter out noise, can let it get through. A spark ignition system generates electri-

cal noise. Vibration of some components, such as crystals, can induce noise. Vibrating metal-to-metal contacts on pushrods and control arms can generate noise. As little as one microvolt at the antenna is enough to operate—or jam—many receivers if it's on the right frequency. You can see the effect of signal and noise on many radios by running a range check in the presence of other operating radios. As you get to the limit of range, you will notice the servos twitching and hunting. At this point, your signal is marginally effective, but the noise is also affecting the receiver.

The most important single thing that can be done to reduce the effects of interference is to insure peak tuning of both the transmitter and receiver. Your radio was tuned when it left the factory. The trouble is, the characteristics of the components change with age, use and exposure to vibration. A periodic range check should be performed in accordance with the manufacturer's instructions. It's not a good idea to perform the check out at the field with other transmitters radiating, because, as noted earlier, this might give a false indication of range. Pick a spot at home where you can range check. Always orient the model the same way. Then, if you get a significant change in sensitivity, you'll recognize it.

When you do experience reduced range, first check the condition of both the transmitter and receiver batteries. If they check out OK, then get your radio to a qualified technician for re-tuning and checkout. Don't try to do it yourself. You can damage the receiver quite easily and, unless you have a Second Class Commercial radio operator's license, it's illegal to tune a transmitter.

Radio installation can drastically affect range. Keep the receiver away from the servos. Keep the antenna away from the servos and have it exit the airplane as close as possible to the receiver. Don't shorten, lengthen or double up the receiver antenna. Let excess antenna trail behind the aircraft. Shock mount and pad all radio components to reduce effects of vibration. It's also a good idea not to fly in the rain, particularly thunder storms (it could ruin your whole day).

All the foregoing won't help you a bit, though, if you and your buddy both turn on the same frequency at the same time. That's a guaranteed shoot-down.

1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023, 2024, 2025, 2026, 2027, 2028, 2029, 2030, 2031, 2032, 2033, 2034, 2035, 2036, 2037, 2038, 2039, 2040, 2041, 2042, 2043, 2044, 2045, 2046, 2047, 2048, 2049, 2050, 2051, 2052, 2053, 2054, 2055, 2056, 2057, 2058, 2059, 2060, 2061, 2062, 2063, 2064, 2065, 2066, 2067, 2068, 2069, 2070, 2071, 2072, 2073, 2074, 2075, 2076, 2077, 2078, 2079, 2080, 2081, 2082, 2083, 2084, 2085, 2086, 2087, 2088, 2089, 2090, 2091, 2092, 2093, 2094, 2095, 2096, 2097, 2098, 2099, 2100, 2101, 2102, 2103, 2104, 2105, 2106, 2107, 2108, 2109, 2110, 2111, 2112, 2113, 2114, 2115, 2116, 2117, 2118, 2119, 2120, 2121, 2122, 2123, 2124, 2125, 2126, 2127, 2128, 2129, 2130, 2131, 2132, 2133, 2134, 2135, 2136, 2137, 2138, 2139, 2140, 2141, 2142, 2143, 2144, 2145, 2146, 2147, 2148, 2149, 2150, 2151, 2152, 2153, 2154, 2155, 2156, 2157, 2158, 2159, 2160, 2161, 2162, 2163, 2164, 2165, 2166, 2167, 2168, 2169, 2170, 2171, 2172, 2173, 2174, 2175, 2176, 2177, 2178, 2179, 2180, 2181, 2182, 2183, 2184, 2185, 2186, 2187, 2188, 2189, 2190, 2191, 2192, 2193, 2194, 2195, 2196, 2197, 2198, 2199, 2200, 2201, 2202, 2203, 2204, 2205, 2206, 2207, 2208, 2209, 2210, 2211, 2212, 2213, 2214, 2215, 2216, 2217, 2218, 2219, 2220, 2221, 2222, 2223, 2224, 2225, 2226, 2227, 2228, 2229, 2230, 2231, 2232, 2233, 2234, 2235, 2236, 2237, 2238, 2239, 2240, 2241, 2242, 2243, 2244, 2245, 2246, 2247, 2248, 2249, 2250, 2251, 2252, 2253, 2254, 2255, 2256, 2257, 2258, 2259, 2260, 2261, 2262, 2263, 2264, 2265, 2266, 2267, 2268, 2269, 2270, 2271, 2272, 2273, 2274, 2275, 2276, 2277, 2278, 2279, 2280, 2281, 2282, 2283, 2284, 2285, 2286, 2287, 2288, 2289, 2290, 2291, 2292, 2293, 2294, 2295, 2296, 2297, 2298, 2299, 2300, 2301, 2302, 2303, 2304, 2305, 2306, 2307, 2308, 2309, 2310, 2311, 2312, 2313, 2314, 2315, 2316, 2317, 2318, 2319, 2320, 2321, 2322, 2323, 2324, 2325, 2326, 2327, 2328, 2329, 2330, 2331, 2332, 2333, 2334, 2335, 2336, 2337, 2338, 2339, 2340, 2341, 2342, 2343, 2344, 2345, 2346, 2347, 2348, 2349, 2350, 2351, 2352, 2353, 2354, 2355, 2356, 2357, 2358, 2359, 2360, 2361, 2362, 2363, 2364, 2365, 2366, 2367, 2368, 2369, 2370, 2371, 2372, 2373, 2374, 2375, 2376, 2377, 2378, 2379, 2380, 2381, 2382, 2383, 2384, 2385, 2386, 2387, 2388, 2389, 2390, 2391, 2392, 2393, 2394, 2395, 2396, 2397, 2398, 2399, 2400, 2401, 2402, 2403, 2404, 2405, 2406, 2407, 2408, 2409, 2410, 2411, 2412, 2413, 2414, 2415, 2416, 2417, 2418, 2419, 2420, 2421, 2422, 2423, 2424, 2425, 2426, 2427, 2428, 2429, 2430, 2431, 2432, 2433, 2434, 2435, 2436, 2437, 2438, 2439, 2440, 2441, 2442, 2443, 2444, 2445, 2446, 2447, 2448, 2449, 2450, 2451, 2452, 2453, 2454, 2455, 2456, 2457, 2458, 2459, 2460, 2461, 2462, 2463, 2464, 2465, 2466, 2467, 2468, 2469, 2470, 2471, 2472, 2473, 2474, 2475, 2476, 2477, 2478, 2479, 2480, 2481, 2482, 2483, 2484, 2485, 2486, 2487, 2488, 2489, 2490, 2491, 2492, 2493, 2494, 2495, 2496, 2497, 2498, 2499, 2500, 2501, 2502, 2503, 2504, 2505, 2506, 2507, 2508, 2509, 2510, 2511, 2512, 2513, 2514, 2515, 2516, 2517, 2518, 2519, 2520, 2521, 2522, 2523, 2524, 2525, 2526, 2527, 2528, 2529, 2530, 2531, 2532, 2533, 2534, 2535, 2536, 2537, 2538, 2539, 2540, 2541, 2542, 2543, 2544, 2545, 2546, 2547, 2548, 2549, 2550, 2551, 2552, 2553, 2554, 2555, 2556, 2557, 2558, 2559, 2560, 2561, 2562, 2563, 2564, 2565, 2566, 2567, 2568, 2569, 2570, 2571, 2572, 2573, 2574, 2575, 2576, 2577, 2578, 2579, 2580, 2581, 2582, 2583, 2584, 2585, 2586, 2587, 2588, 2589, 2590, 2591, 2592, 2593, 2594, 2595, 2596, 2597, 2598, 2599, 2600, 2601, 2602, 2603, 2604, 2605, 2606, 2607, 2608, 2609, 2610, 2611, 2612, 2613, 2614, 2615, 2616, 2617, 2618, 2619, 2620, 2621, 2622, 2623, 2624, 2625, 2626, 2627, 2628, 2629, 2630, 2631, 2632, 2633, 2634, 2635, 2636, 2637, 2638, 2639, 2640, 2641, 2642, 2643, 2644, 2645, 2646, 2647, 2648, 2649, 2650, 2651, 2652, 2653, 2654, 2655, 2656, 2657, 2658, 2659, 2660, 2661, 2662, 2663, 2664, 2665, 2666, 2667, 2668, 2669, 2670, 2671, 2672, 2673, 2674, 2675, 2676, 2677, 2678, 2679, 2680, 26

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CLAUDE McCULLOUGH ON RC

New Math: Bob Wischer, long time RC Scale nut and 1972 World Championship Team member, has done some thoughtful work on the mathematics of modeling. Since the metric system is more convenient, required for FAI competition and in time will become the U.S. measurement standard, Bob feels we should begin to minimize the use of inches and feet in model calculations. Instead of referring to the scale of his Pip J Emerald as $2\frac{1}{2}"=1'$, he prefers to say it is built to a ratio of 4.8 to 1.

To determine the ideal weight and horsepower of a model to duplicate scale-like flight, Bob divides the prototype aircraft's gross weight and horsepower by the cube of the scale ratio. In the case of the Emerald:

$$4.8 \times 4.8 \times 4.8 = 110.5 \text{ (scale factor)}$$

$$\text{Prototype wt. } \frac{1100}{110} = 10 \text{ lb. model wt.}$$

$$\text{Prototype power } \frac{100 \text{ hp}}{110} = .9 \text{ hp (60 engine)}$$

These calculations can be made in the planning stage, before the model is built, and thus help to avoid having an overweight or underpowered (or both!) bomb that would have little chance of performing properly. The formula will work from Peanut scale all the way up to a giant-sized project.

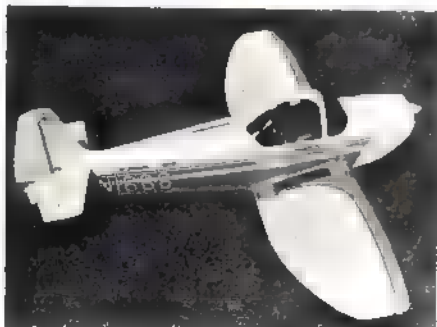
Applied to that universal example, the Piper J-3 Cub, the accompanying table shows some interesting figures. A small, rubber-powered, stick-and-tissue Cub should weigh $1\frac{1}{4}$ oz., and would need four strands of $1/8"$ flat rubber for power. The quarter-scale version would weigh 17 lb. and require a hot 60. Because of building technique efficiencies, and the fact that the weight of the radio equipment would remain the same regardless of model size, it is likely that the larger Cubs could come out lighter than the results of the formula. This is probably one of the reasons why very large models perform so well. If the lighter model is fitted with an engine bigger than the formula indicates, then the model will be capable of better flight performance than the prototype. This might be advantageous in many cases but would not, of course, be scale-like flight.

Piper J-3—1100 lb., 65 hp

Scale	Ratio	Factor	Model Weight	Model hp
$1/2"=1'$	24:1	13824	1.27 oz.	.004 hp
$3/4"=1'$	16:1	4096	4.25 oz.	.015 hp
$1"=1'$	12:1	1728	10.2 oz.	.037 hp
$1\frac{1}{2}"=1'$	8:1	512	2.15 lb.	.126 hp
$1\frac{3}{4}"=1'$	6.66:1	322	3.4 lb.	.2 hp
$2"=1'$	6:1	216	5 lb.	.3 hp
$2\frac{1}{4}"=1'$	5.33:1	152	7.2 lb.	.4 hp
$2\frac{1}{2}"=1'$	4.8:1	110	10 lb.	.6 hp
$3"=1'$	4:1	64	17.2 lb.	1.02 hp

Recently, N.A. Taggart announced the formation of the Radio Control Performance Scale Model Society, whose purpose is the promotion of scale-like flight. Bob's formula should be a valuable tool for builders who favor this type of endeavor, as well as for those who enjoy the intricacies of standard AMA RC Scale contests.

There must be some slide rule types out there with other numbers games relating to scale modeling. Send them along to this column c/o AAM.



Bob Wischer (Wisconsin) made the International Scale Team with his Emerald last year. A good example of what using a little math in your modeling can do.



It's all a fake! The plane is a model (Walt Moucha's Sopwith Pup), and the buildings are stage trappings at Rhinebeck. A nice tableau.

Detail of Bob Wischer's Emerald shows taped and stitched ribs, scale hinges, trim tab and authentic fairings.



BILL BOSS ON CL

Sport Scale: In last month's column, we talked about the use of the Sport Scale event as a means in which a scale builder could experiment with new ideas for control systems, building techniques and finishing. With this idea in mind, last month's column outlined a control system that would provide throttle and flap control, as well as auxiliary fuel tank drop. In my article, throttle and flap control were covered, and this month we will cover the auxiliary fuel tank release and tank construction.

Release Mechanism: Photo A shows the fuel tank release mechanism, as it is installed on the underside of the $1/8"$ plywood control system platform. The fuel tank release is connected by a Kwik-Link to a control arm between flap control arms, and is positioned so that it does not interfere with the flap operation. Proper positioning of the fuel tank release arm also makes attachment of the tank release Kwik-Link easier.

The "Y" shaped wire is mounted via holes drilled in the aluminum angle. This mounting keeps the release rod in position throughout its range of operation. The two aluminum plates at the left are to hold the tank in place, and to make remounting of the tank easier. The tank release mechanism should be adjusted so that the tank is released when the engine throttle is about three quarters closed. This setting will allow the plane to be taxied without the tank dropping off, and will permit the tank to be released in the air, without shutting off the engine.

Tank Construction: When adding operational features to a scale model, one of the objectives

should be to keep the item as light as possible. The fuel tank, was about nine in. long and had less than a two and a half in. dia. at its widest point. The tank was made completely from scrap balsa and weighed only one and a half oz. when completed.

Start construction by cutting out the two pieces, as shown in the sketch, from $3/8"$ balsa sheet. The two pieces are then inserted, one into the other, to form an "X"; this provides the basic shape of the fuel tank. After these two pieces are glued together, build up one quarter of the tank from balsa scrap, and shape the outside to the contour of the "X." Before proceeding to the second quarter of the tank, carve out any excess wood from the inside, keeping the tank wall about $1/8"$ thick. Continue this procedure until the tank is three quarters complete. The tank cross member can now be removed, as shown in the photo. Also, at this point the tank "hanger" (see sketch), which is made of $1/4"$ aluminum plate, is epoxied in place. When the hanger is firmly in place, the last quarter of the tank can be completed. Finish tank by carving, sanding and dopping.

While this illustration has covered the construction of an auxiliary fuel tank, the same principles can be applied to bombs or any other droppable items. Remember, the object is to keep it light. Add as little weight as possible to the plane, and keep within AMA rules for safety in the operation of droppable items from our models.

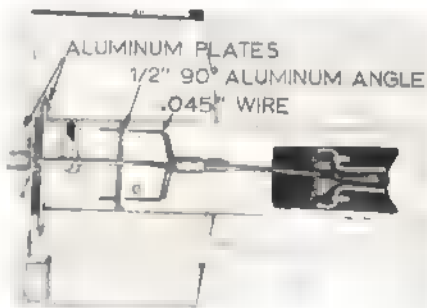
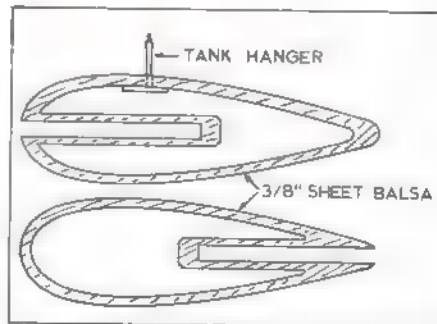


Photo A—Auxiliary fuel tank release mechanism is easily installed beneath the ballcrank platform in Top Flite's Stand-Off Scale P-40. See April AAM for full control system details.



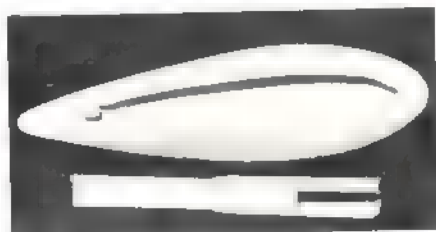
Start fuel tank construction by cutting out the pieces, as shown, from $3/8"$ balsa. When glued together, they form the basic crutch of the tank.



Henry A. Haffke's "Miss America." Photo by Dick Boston



The auxiliary tank at the half-way construction point. Note how the interlocking crutch gives the basic shape of the tank.



When three quarters complete, the tank will look like this. The center cross members have been removed to save weight.



The completed tank ■ its release mechanism.

WALT MOONEY ON FF

Scalemasters' Auction: The Chicago Scalemasters put out a monthly newsletter. These are available to non-members at \$3.25 per year. Back issues are also available. Contact Editor, Keith Ward, 636 Swain, Elmhurst, Illinois 60126. The first 1974 issue had a couple of goodies in it, including an announcement of the Scalemasters' annual auction. People who wish to sell an item may list their minimum asking price. If the item is sold for more than the listed minimum, the extra money goes to the scale team fund. This seems like a very good way to raise money for worthy causes.



Sommer Monoplane disguises the cylinder of its CO-2 power plant as the top jug in its dummy radial. (Photo by Robert Conli)

The January newsletter also contained a list of historic aircraft plans, available from the Smithsonian Institution. (Price: \$1 per plan sheet.) There are 37 airplanes on the list. Undoubtedly, you can obtain a list by writing to the Smithsonian Institution, Washington, D.C. 20560.



A biddy Bede—Bill Hannan's Peanut BD-6. (Photo by Bill Hannan)



The most popular airplane in aviation history is now available in Peanut Scale from Peck-Polymers. Lots of extras in the kit box. (Photo courtesy of Peck-Polymers)

Wire Wheels: Fulton Hungerford's great little scale wire wheels are obviously getting to be known around the world, because Bill Hannan has forwarded a picture of a Sommer Monoplane constructed by Jacques Poulliquen of Vence, France. It's a nicely detailed model, using a Brown Junior CO-2 engine as the top cylinder of the otherwise dummy motor.

The BD-6: As one of his newer ventures, Jim Bede has constructed a little high-wing, single-

(Continued on page 92)

Cessna's Past 'masters

A tradition of excellence in lightplane engineering grew out of the Depression. The mastermind behind it all was a guy named Clyde.

by Patricia T. Groves

June 1933 wasn't exactly a bright and shining year in which to be graduated with ■ aeronautical engineering degree.

Industry-wide, aviation was floundering, and many companies had gone belly up.

Those managing to hang in there, were only doing so on a barely quivering shoestring. Engineers, mechanics, pilots or constructors were happy to work—anywhere—even if only to be able to say they were.

In June 1933, Dwane L. Wallace picked up his brand-new AeE (Aeronautical Engineer) sheepskin and went out into the world anyway.¹

After all, when he'd started in at the university in Wichita, Kansas, things sure looked promising enough. Aviation was a growing industry, and his uncle's Cessna Aircraft Company was among

the firms there in town. With 200 airplanes already off its line, Cessna Aircraft was going great guns.

They were monoplanes, too, in a day when monoplanes were considered pretty freaky. It was still ■ biplane era. And any monoplane with fully-cantilevered wings was especially suspect. Like a prostitute—no visible means of support.

But Cessna monoplanes gradually gained acceptance within the aviation society. During 1927, '28 and on into '29, good performance at air races earned good notices and brought customers to the door. Americans like a winner.

And Cessna production aircraft were winning a good reputation as fast, efficient airplanes. It all added up to ■ bright and shiny future. Then came October...

The shock waves of the Depression had an immediate effect. For many, the thin line between extinction or survival quickly evaporated. Investor-held stocks became pieces of paper, not even worth the pulp they were printed on.

But for Clyde Cessna, "extinction" wasn't an option. Deeply rooted in his nature was an American Great Plains heritage, wherein wagon trains and a hard scrabble history produced lean, diligent Westerners—fiercely independent and with confidence in their own ability.

When Cessna stockholders gathered for their annual meeting in Wichita on February 5, 1930, a large black cloud enveloped the room. "OK," Clyde admitted, "so we're in a bad situation. If ■ can't do what we planned to do, then we'll just have to do what we can do."

Before anyone could argue, he pumped out a plan. "Look—some people still have money and can afford to buy airplanes. And those that have airplanes are going to need servicing. Furthermore, people want to fly. And if they can't fly airplanes—well, we have this \$398 glider that just about anybody can afford! It's salesmanship that will beat this depression!"

Believing in himself, hard work and keeping the place open didn't exactly revitalize the Board of Directors, but it did keep Cessna from collapsing. For the moment.

The Cessna Company managed to limp through 1930 selling gliders, an occasional airplane, doing maintenance work, renting out unused factory space, racing for (much needed) prize mon-

Photo courtesy of The Smithsonian Institution



Entered in the 1935 and '36 National Air Races, C-34s brought home the Detroit News Air Transport Trophy for aircraft efficiency both times. Winning these and other airplane competitions led to the series name of Airmaster. (Photo courtesy of The Smithsonian Institution)

ey—anything to make a buck. But the massive debts just wouldn't disappear.

Nor could determination and hard work erase stockholder pessimism. At the next annual meeting, in January 1931, the Board of Directors threw in the towel. Although not officially dissolved, the company nevertheless voted itself into deep hibernation. And Clyde was let out into the cold.

With his son Eldon, Clyde then opened up a small shop down the street and went back to work. Getting through 1931, '32 and '33 under the name C.V. Cessna and Company, father and son produced custom-built aircraft, including two racers.

These made-to-order airplanes were a progressive improvement over past Cessna models. And, although not evident in the press of the moment, this period provided an education for the future.

While the C.V. Cessna "School of Hard Knocks" was in session, Dwane Wallace was finishing at the university. He'd almost given it up a couple times himself, but the family inability to quit—anything—was too strong. Then, in June 1933, he proudly took his Bachelor's Degree to his uncle's shop in order to show him that he, too, was ready to work.

They laughed and joked about how it all stemmed from the day, back in 1921, when CV had crammed Dwane and his two brothers, Dwight and Deane, into the front cockpit of a Swallow biplane, and had taken them for their first airplane ride. And now, Dwane was a pilot himself. And an engineer. And ready to work.

But a lot of water had gone under the bridge in those 12 intervening years. The cold facts were that CV and Eldon were on short rations. They couldn't take him on.

So Dwane Wallace talked himself into a job with Walt Beech, who had fired up again in a rented area of the closed Cessna plant.

But, although Dwane went to work for Beech, he went to work on his uncle. Things were beginning to open up now, and it was time for Cessna Aircraft to wake up and get with it.

When the Board of Directors gathered on January 10, 1934, there was quite an eye-opener ready for them. By the time the meeting convened, a Cessna-Wallace windmill was in full swing. At the end of that January day, there was almost a whole new Board of Directors. Dwight Wallace, Dwane's attorney brother, had made a trip through investor-land gathering up all the proxy votes he could muster.

With Clyde Cessna now President, Dwight as Secretary-Treasurer and Dwane in charge of the plant, the new Board of Directors agreed to again manufacture the DC-6 line of airplanes. Also, approval was given for the new airplane that was to become the beginning of the Airmaster series of Cessna airplanes.

From January 10, 1934, until June 1, 1935, when the prototype was completed, the C-34 (named for its design

Text continued on page 80.

Karlstrom drawings on pages 64 and 66



Photo courtesy of The Smithsonian Institution

On floats, on skis or on wheels, the C-37s enjoyed the highest production run. From August 12, 1936, to May 13, 1938, 47 were built under ATC 622. (Photo courtesy of The Smithsonian Institution)



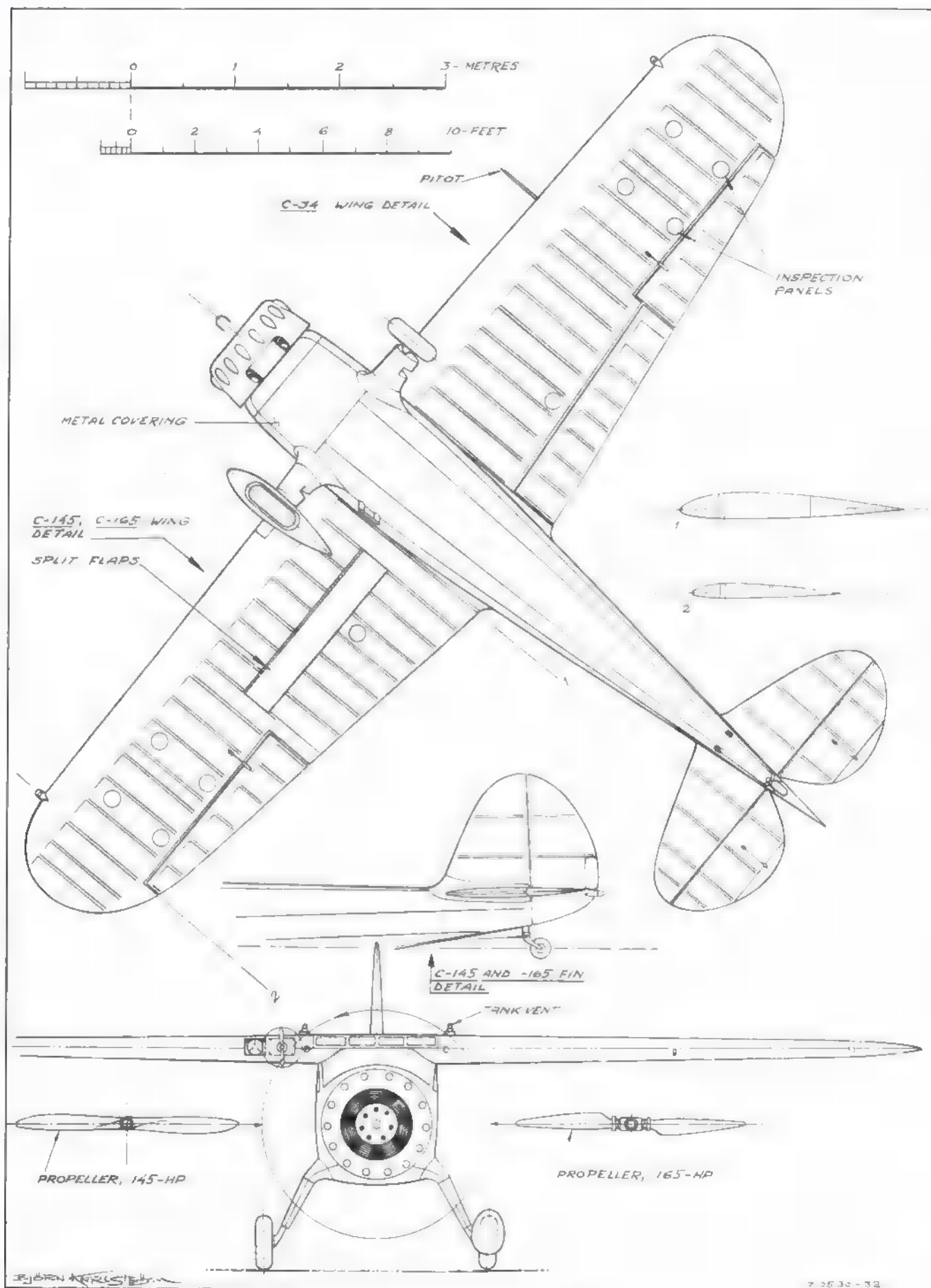
Photo courtesy of Cessna Aircraft Company

No. 4 in the C-145 series, this Airmaster (c/n 454) completed on Halloween 1938. On virtually the same airframe as the prototype C-34, Cessna's continual up-grading and refinement of the line accomplished without sacrificing performance and handling qualities. (Photo courtesy of Cessna Aircraft Company)



Photo courtesy of Cessna Aircraft Company

This C-165 (c/n 590) is one of the last in the Airmaster series. Basically the same as the C-145, a 165 hp Warner Super Scarab gave the C-165s more, better and greater around performance. (Photo courtesy of Cessna Aircraft Company)



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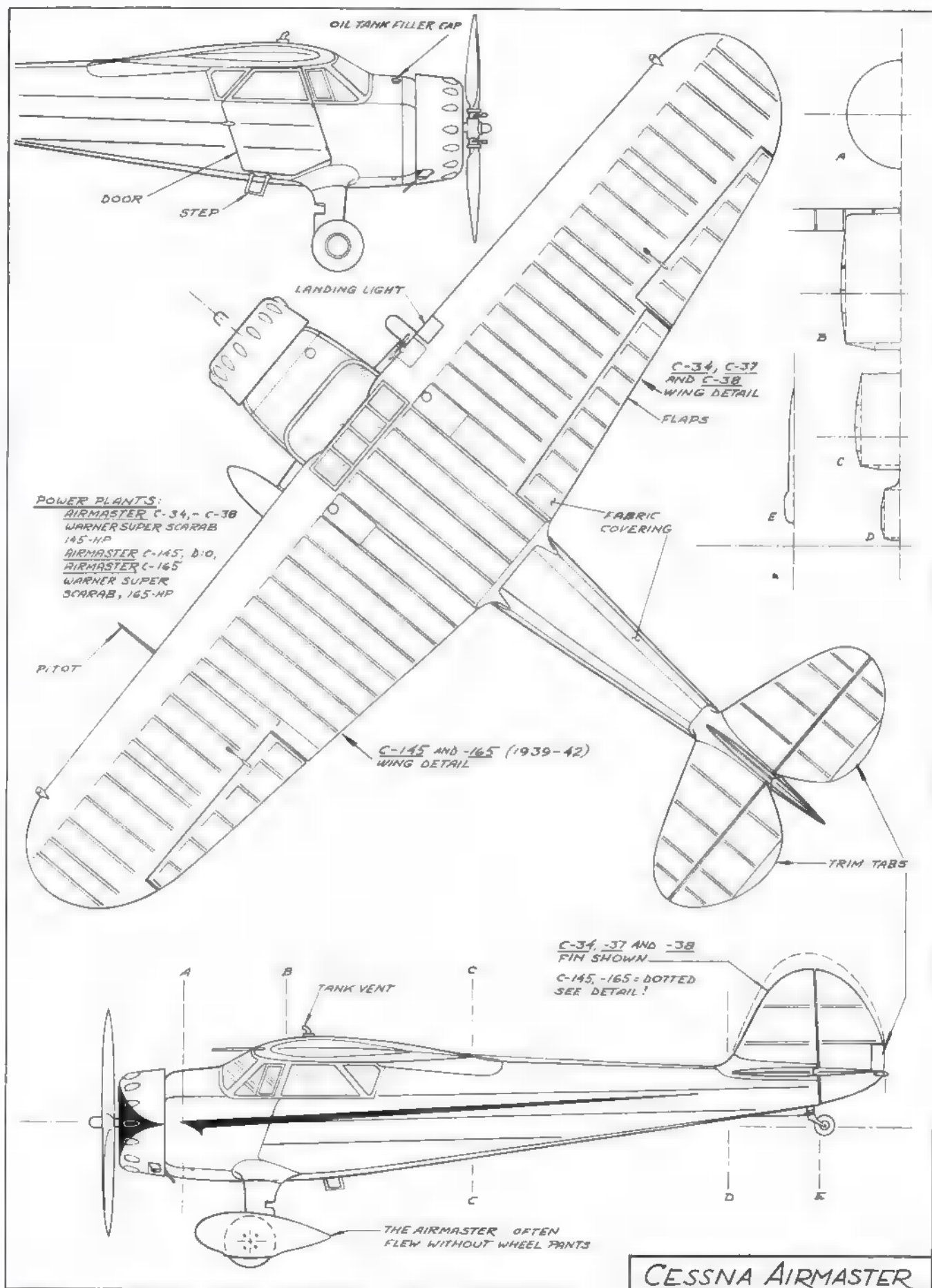
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MITCH POLING
ON ELECTRIC FLIGHT

Takeoff: Necessity is the mother of invention, and this led to my experiments in electric power, and to this column. The April issue of AAM described the RC SuperStar, which arose from the need for a silent and clean aircraft to please a very pretty young lady, my fiancée. Necessity yielded to fascination, and then to real fun and pleasure—the advantages of electric power became evident. I fly from a local schoolyard, in the middle of town, and people like to watch the plane fly. Their reaction is positive—on the "that sure looks like fun, I'd like to try it" side, never on the negative side—a pleasant change from the days when I flew glow engines.

I have a two-airplane fleet, the SuperStar and a two-channel electric version of the Ace Whizard, which uses a motor from a Black and Decker cordless grass shear. I am also building an Electra-Fli and an RC biplane for the motor used in the SuperStar. My gas planes have been quietly retired! If this sounds like a lot of fun, you're right. It is! It also does not have to be expensive: the batteries and motor for the two-channel airplane cost less than \$15.

Flight: There are two tried and tested ways to familiarize yourself with electric flight. The first is with the RC SuperStar; the second is with the Electra-Fli and Astro Flight 10 motor. Both systems have been flying for a year or more, and have proven themselves. It is recommended that beginners in radio-controlled electric flight start with either one of these.

The commercially available power units and batteries are made by Astro Flight, Kroker, Galtier and Mattel. These were described in the July 1973 AAM. Two non-commercial units have been tried by Ed Sweeney and myself, and results have been good so far. The Mabuchi RE 260 motor (used in the SuperStar) has enough power for 010 to 020 free flight planes, using two GE Permacell batteries and a 4-2.5 prop on direct drive. The Mabuchi RS 54 motor, supplied in the Black and Decker cordless grass shear, has enough power for 049 free flight and RC airplanes, using a 6-4 prop on direct drive and seven GE Permacell pencils. This motor is available from Black and Decker for \$5.50 as a replacement part number 86749, shear 8280.

Airplanes: There is a wide open field here—designs are needed for this aspect of the sport. AAM would like to publish electric designs, so go to it! Designs this columnist would like to see include: scale FF and RC, Peanut scale and Old Timers, both FF and RC. Ways of adapting gas-powered kits to electric power are also needed.

Batteries: One fact that most modelers do not know is that many of the nickel-cadmium batteries used in the hobby can be fast charged. This applies to the vented cylindrical cells. Button or disk type cells should not be fast charged. Fast charging should either be done on fully discharged batteries (discharge one or two cells at a time to complete) and then charged at a timed rate, if not fully discharged, monitored and terminated at an appropriate voltage or current value. The SuperStar is an example of the first technique: the Astro 10 is an example of the second technique. Astro Flight markets a complete field box for electric flight. This includes a timer, ammeter and resistor network. The retail price is \$30, and the equipment can fast charge receiver and transmitter batteries, as well as the Astro Flight batteries.

The Bouchers of Astro Flight outlined the monitoring method for charging the Astro 10 pack: the initial charge rate is three to four amps, the final charge rate is .5 to .75 amps (with the voltage of each cell at 1.5). If charged too long, the rate will start to rise again, due to heat generated in the battery. If the initial rate is six to eight amps, there is a short between the cells, and this must be repaired before flying. If the rate is low, below two amps, either the charger battery is too low, or the pack has developed a memory. The latter is cured by flying a few times. If the charger battery has just been freshly charged, the initial charge rate may be above four amps (near five), decrease the charge time a little.



Roland Boucher of Astro Flight puts a charge into his Bushmaster. Note grubby, messy, smelly, sloppy ground support equipment required by other fliers, while clean-cut Roland keeps it neat—a pin with electric.

Other items: the charging leads, as shown in the Electra-Fli article, too long, and can cause radio interference. Shorten them and twist the leads together (like servo leads), or use lamp cord, in which the leads are molded parallel to each other. The Electra-Fli plans and pre-cut ribs are available from Astro Flight for \$5.

This author has found that the GE Permacell pencils, number GC-1, quick charge well and deliver a lot of power. An initial rate of three to four amps is used, and terminated at 1.75 amps. This gives a full charge in 10 min. The Gould pencils by Ace Radio Control, Inc., (number 38K40) do equally well.

News: The Boucher brothers recently gave an impressive demonstration of the Bushmaster, which uses the Astro 25 unit. The Bushmaster has abundant power—loops from level flight done smoothly, and it is capable of all the three-channel maneuvers. The Bushmaster specifications are: 60-in. span; wing area, 600 sq. in.; weight 75 oz.; flight duration, 8-10 min.

Next column will give a report on Peter Russell's electric planes powered by the Kroker units, and more information on this columnist's units. 'Til then, keep them flying, and send in lots of letters. News and questions are both appreciated!

JOHN BURKAM ON HELICOPTERS

Toledo: The first new helicopter to be unveiled at the '74 Toledo show was the Kavan Allouette III, a 19-powered, 40 in., cute little bird. The projected target price for the kit is \$165. Although there was no transmission in the model, the rotor itself had been flown and behaved well (as most Hiller rotor systems do). Collective pitch was fixed. The Allouette is to be available in September.

Dave Keats' Polecat, as shown at Toledo, is the simplest helicopter I have ever seen. It is intended for doing those maneuvers you always wanted to try, but were afraid to. There was a certain beauty in the gold anodized, square tubular main keel, and the square tubular tailboom. The prototype and the first production model, were both flown at the show. Price announced for the ARF kit will be \$250.00 and first deliveries will begin in late March. Fox 25s powered the show models. Rotor dia. was 41 in., and weight was 4 1/4 lb.

The helicopter with the most beautiful lines by far was Dieter Schluter's Gazelle. A new Hiller rotor head, with collective pitch, seemed very well engineered. Size and internal works were along the lines of Dieter's tried

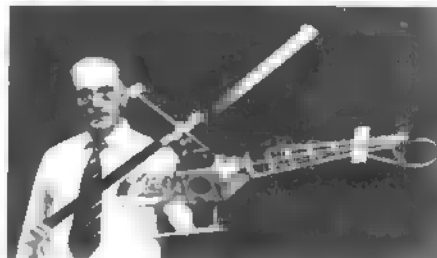
and proven system as used in the Enstrom and Hueycobra.

Outstanding among the home-built helicopters were Harold Everson's Enstrom and Bill Ellis' Kavan Jet Ranger. Bill's model had a detailed cockpit interior, complete even to the overhead, screens and vents, etc.

The winners of the helicopter trophies at Toledo were John Werne (first), with his Hughes 300; John Werne (second), with his Jet Ranger (this modeler from Akron, Ohio sure does nice work); and Harold Everson (third) with his Enstrom. The 'copter trophies were sponsored by Du-Bro.

New World Record For The U.S.: (Courtesy of Nate Rambo and his Traveler helicopter) On January 26, Nate flew his Traveler 2509.87 meters, a new World Distance Record for helicopters. From takeoff to landing, the flight took 3 min., 16 sec.

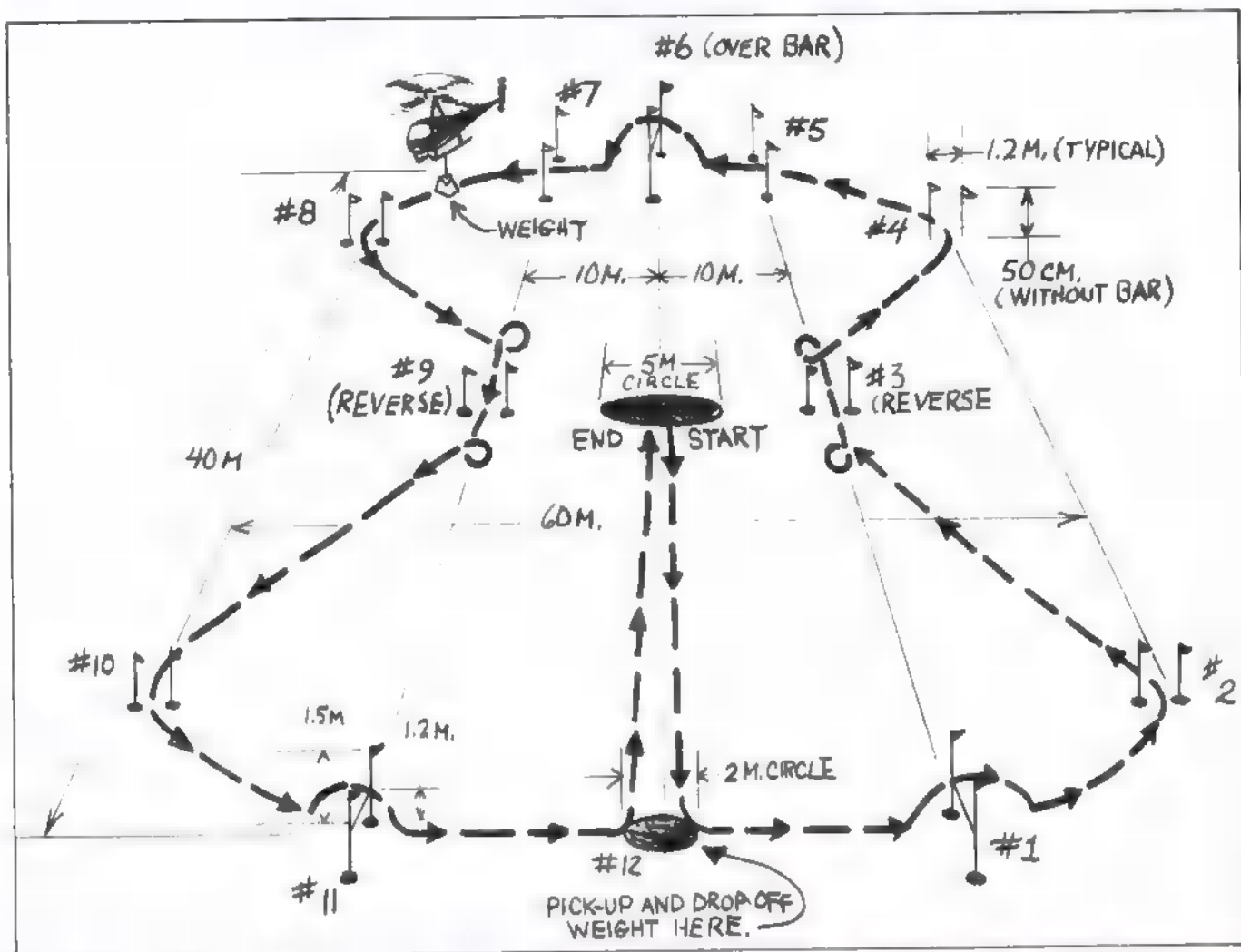
He flew down a runway at Oxnard Air Force Base, while roped to the tail gate of a station wagon. Nate kept yelling "Not so fast!" However, the driver thought that he



Mr. Kavan with his new 19-powered Allouette helicopter.

Bill Curtiss won the Tangerine Championships with his new Du-Bro Shark. A Hughes 300 sits in the foreground. (Photo by John Burkam)





was saying "Go fast!" They were going 40 mph at times, during the run!

Traveler is an original fuselage, with Kalt Hueycobra mechanics. It packs into a suitcase for traveling! Nate has his eye on the speed record next, which is easy to beat. . . It's now zero mph! There's not much opportunity for U.S. fliers to compete directly with Germans in flying skill, but a good indication of technical superiority is who holds the most world records.

Come on, guys, there are three more helicopter records to be brought to this country—speed, closed course distance and duration.

1974 Helicopter NATS: Walt Schoonard has agreed to direct the NATS RC helicopter event at Lake Charles, La., using the rules which worked so well at the Tangerine International RC Helicopter Championship. AAM has pledged significant financial support to this event.

Briefly, the events will be: Scale, with one 'copter limit, and a 15 sec. qualifying flight. Published three-views are required. Maneuvers: 15 sec. stationary hover; figure 8; fore and aft flight between targets; lateral flight between targets; and precision landings on four targets. Walt has a complete set of rules, which include details of each maneuver, sample score sheets, field layout, and drawings of each maneuver. For this information, as well as the exact times and place for the competition, write or call Walt Schoonard, 2080 Sharon Dr., Winter Park, Fla. 32789. Phone: (office) 305-422-1531; (home) 305-647-1335. He can also use lots of help, since this type of event requires judges, timers, marker watchers, etc.

Winner of the Tangerine helicopter event was Bill Curtiss, flying his new Du-Bro Shark. Ed Walther took second in maneuvers, flying a Hegi Hueycobra. Third, with his Kalt 'Cobra, was Steve Darlington, who also took

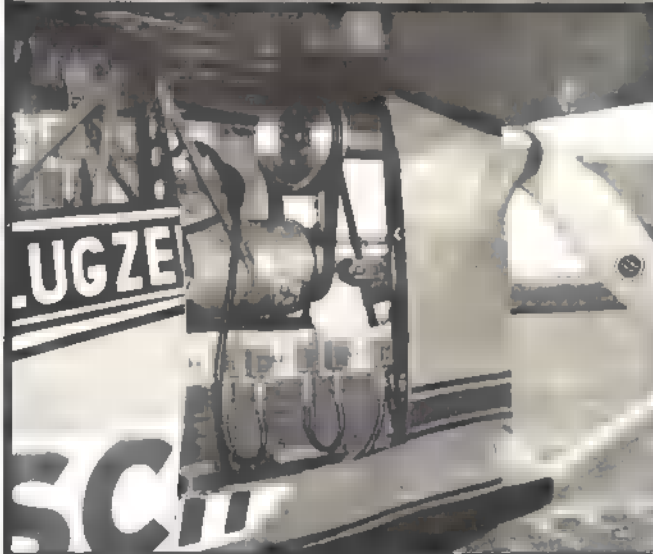
(Continued on page 87)



Nate Rambo set an official FAI World Distance Record (8136 ft.) with his Traveler. Model wasn't thus named because it traveled the farthest, but rather because it can be stored in a suitcase for travel. (Photo by Nate Rambo)

Ed Walther walked off with a first in Scale, and a second in Maneuvers with his Bell Cobra at the Tangerine Internats Helicopter Championships. (Photo by John Burkam)





TOP: Other than being festooned with advertising, the MB-E1 gives no indication that it is electric-powered. The plane is essentially a "stock"-powered glider. **ABOVE LEFT:** The Bosch power plant and its belt-driven prop shaft sit above a bank of Varta batteries which provides about 18 min. duration. **ABOVE RIGHT:** Herr Fred Militky of Graupner developed the MB-E1. Here he holds his contribution to the model world. The Hi-Fly is specifically designed for twin electric motors. **OPPOSITE:** Clearing the airport boundaries with ease, the MB-E1 carries man aloft for the first time under electric power.

MB-E1: Electromotor Airplane

Rarely does a successful experimental airplane carry a design number of "1."

However, on October 21, 1973, the manned electromotor airplane MB-E1 took off from the runway on its first attempted flight, climbed to 300 meters, did a few circles of the field, and landed safely after nine min. five sec. Electropilote test pilot, Heino Brditschka, used approximately half of the battery charge during the flight. No external devices were used to assist the plane. As far as the participants in this event know, the MB-E1 is the first manned airplane to rely completely on a self-contained electrical propulsion system and a self-transported current source.

Technical Data

Except for the power system, this test craft is of normal construction. The plane is one of a limited series of STOL power gliders with the designation HB-3, manufactured by H.W. Brditschka OHG Airplane Factory in Haid bei Linz, Austria. The HB-3 is normally flown with a 26.4 kW combustion engine (36 hp) and a pusher prop.

The plane has a wingspan of 39.37 ft. The fuselage measures almost 23 ft. in length. Surface area of the wings is approximately 153 sq. ft. At maximum flight weight, the standard HB-3 has a wing loading of 5.46 lb./sq. ft. and a glide ratio of approximately 20. The plane is definitely not a motorized, high-performance glider with extreme

aerodynamic characteristics. Aerodynamically, the airframe (including the prop) was not altered at all.

The combustion engine and auxiliary units were removed from the MB-E1. In their place was mounted, near the CG, a Bosch DC electromotor with a 10 kW rated output. The motor drives the prop through a V-belt.

Four standard Varta NiCad battery units were mounted as an energy source. When wired together, they yield over 100 volts terminal voltage. The charge is sufficient for about eight min. of continuous operation. Use of more expensive batteries with very high power density (silver-zinc among others) was purposely avoided. Because of the weight of the batteries, the gross weight

(Continued on page 89)



In these days of energy crisis, man has found a mode of transportation that emulates our models. The MB-E1 recently got a human being airborne successfully, and thus opened up new vistas of powered flight. / by Fred Militky

Translated by J. Allen Miller
Photos courtesy of Graupner Mfg.

MODEL TECHNIQUES

More Super Design Contest Goodies

R. L. Craig

There are any number of approaches to effectively cover up those dark holes occupied by retracting gear. The important parameters are: (1) realistic appearance; (2) self-adjustment to insure closing tightly; (3) low drag to minimize power requirement for actuating; and (4) capability of construction with hobby tools and common materials.

The drawings are self-explanatory. You will note that the main gear system incorporates three doors: fixed, main and secondary. The fixed door is necessary due to the two different pivot or hinge points of the main retracts and the main retract door. Without the fixed door, you would have an opening with the gear in the up position, or you would need an excessively large secondary door. This fixed door is mounted directly to the landing gear wire by means of the grooved aluminum block and two 4-40 x 1/4" flathead screws.

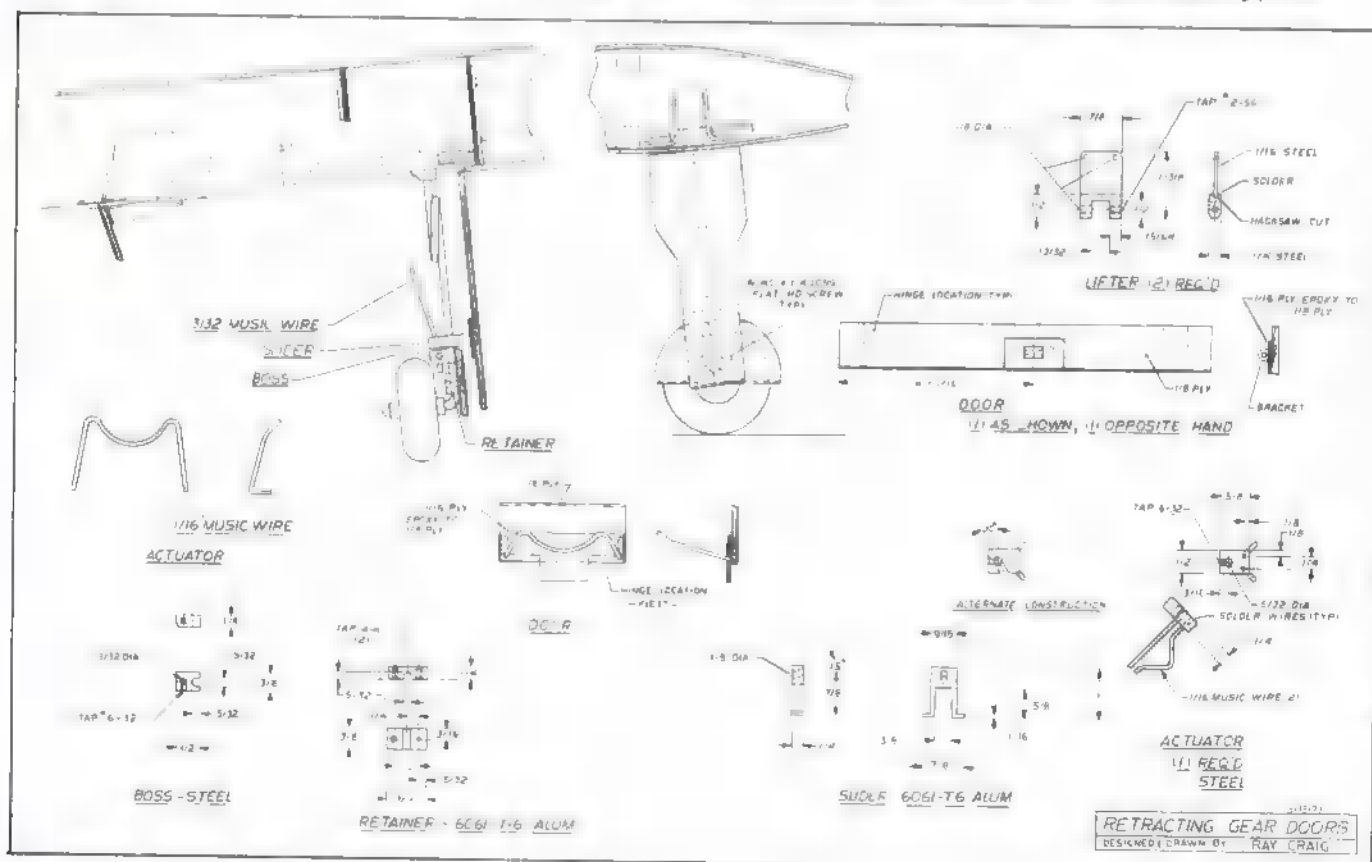
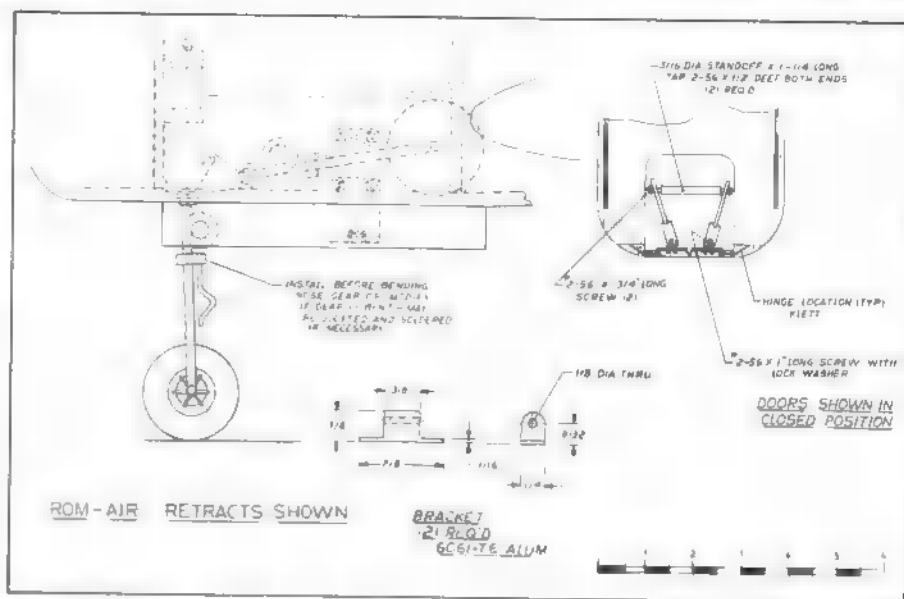
The half door, or secondary door, is hinged as shown, and can be spring-loaded to the open position, if necessary. The 1/16" plywood, which secures the secondary door wire actuator, extends 3/8" inside the wing. This is to limit the secondary door travel when closing.

Since music wire is used to actuate both main and secondary doors, the adjustment is non-critical. The wire will

flex to provide a fairly wide range of adjustment, and will also maintain a light tension on the doors when closed.

The nose-wheel door system is rather straightforward. It also can be spring-loaded to the open position, but this is probably not necessary. One problem that may be encountered is the installation of door actuator. It should be installed prior to bending the 5/32" LG wire. If the wire is already bent, then use the alternate construction shown on the drawing. Either one will work fine.

The builder may find it necessary to modify the bend of the 1/16" music wire on the actuator. This will depend on the accuracy of construction to insure properly spring-loaded doors in the closed position. Modify the bend in the final adjustment. Note: Do not heat music wire to bend. Always over-bend about 5° to allow for spring back when bending force is removed. Also, it is good practice to make all bends around a 1/8" dia. pin, thus eliminating a sharp corner and a future breaking point.



N. L. Lewis, Jr.

The door system works in direct proportion to the movement of the nose-wheel after it enters the wheel well and goes to the "all up" locked position.

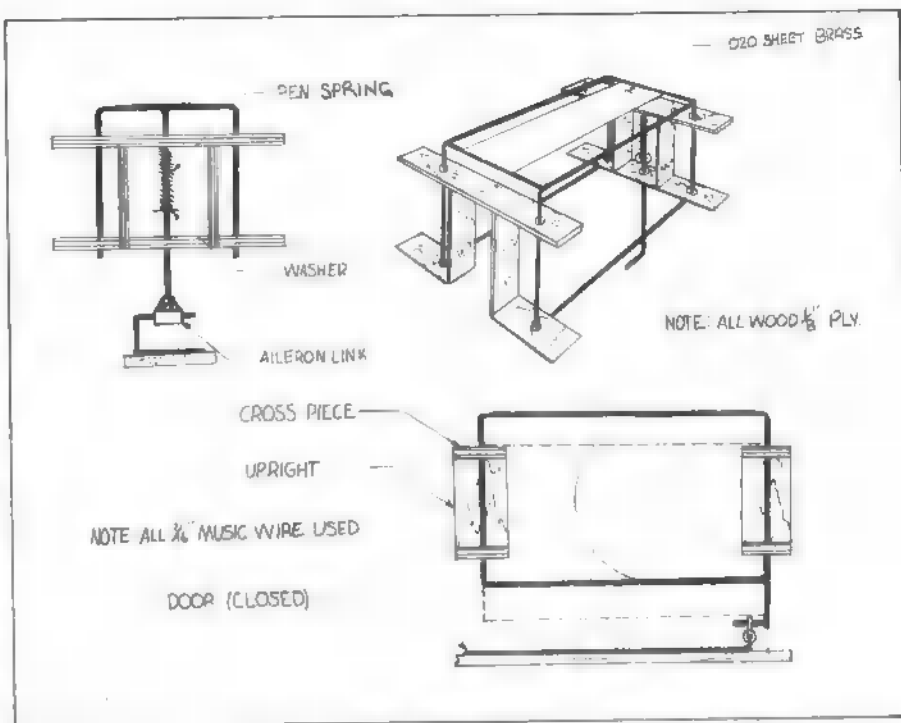
CONSTRUCTION

Cut the crosspieces from 1/8 x 1/2" plywood. Three of the crosspieces will be the full width of the fuselage. One piece will be cut into thirds, to allow the gear leg to raise into the door system. Do not install in the plane yet.

Next you will need to decide how tall the uprights are to be. A good rule-of-thumb is to take the dia. of the nose-wheel, minus 1/2". Drill three 3/32" holes in the crosspieces, so that the music wire can be run through them, as indicated in the drawing. To eliminate a bind in the system, make sure the holes in the top and bottom crosspieces are evenly aligned. Now install eyelets in the crosspiece holes. Completely assemble the bracing structure with five-minute epoxy and let cure.

The rod assembly is made up of four pieces: two sides and two crosspieces. Bend the two sides into large "Us," soldering the cross braces at the corners. Now slide the legs of the "Us" through the holes in the wood structures. Make sure all the rods work smoothly. If they don't, unsolder and do it again. When all is smooth, solder the lift plate from cross wire to cross wire. Now add the door linkage by soldering the door link to the plate at the aft end.

Place complete wire and plate assembly through wood structure. Place spring and washer on the door link as you slip it through the structure. Solder the washer to the link. After this is com-



plete, bend the sides to meet under the structure and solder. Now is the time to slip the assembly into the plane. Remember that the tank must be installed above this structure.

The wheel door is simple. Cut a piece of the fuselage bottom material to the shape desired. Epoxy a piece of 1/16" wire along the inside of the door. Use an aileron link as a coupling.

As you can see, the operation of this door is very simple. As the wheel enters the wheel well, it strikes the lift plate. As the wheel continues, it lifts the music

wire assembly in proportion, thus lifting the door link. Down is the exact opposite. The small spring will hold the door open while the gear is in the down position.

LIST OF MATERIALS

24 in. 1/16" music wire
1/8 x 1/2" plywood
1 ball-point pen spring
1 small flat washer
10 small eyelets
1 piece .020 sheet brass 1 x 6"

(Exact dimensions will be dependent on the plane size.)

Dr. Henry Keck

NOSE AND WING DOORS

There are many advantages to this system: (1) no mechanical linkage from servos; (2) no extra servos; (3) no excess electrical drain (freon does the work); (4) no dependence on gear strut motion for actuation; (5) no physical contact with the gear struts when open; (6) the doors act as brakes when open, providing the capability to approach the "spot" under partial power and control the glide distance via power setting. The system has been thoroughly tested and found entirely reliable. I think it has contest quality—defining this as the ability not to fail.

Nose Door: Fig. 1 shows a typical bottom view of the nose section and the cross section at the wing forward bulkhead. There are some important points to bear in mind when fabricating this system.

(a) Always put the door on the plane so that it opens toward the right wing side of the plane. The reason is simple: if the chin of the plane has curvature (and most planes do), the door will behave as an airfoil in the open position.

Opening the door to the right helps to offset prop torque (always to the left) during takeoff.

(b) Don't ■ three door hinges—this merely causes binding. Always use two hinges. Furthermore, make the hinge slots wide and mount the hinges in silicone rubber.

(c) Don't get fancy and try for split doors. They look neat, but just add unnecessary mechanical linkages to the system.

(d) The Sonic-Tronic cylinder is shown mounted vertically in the fuselage, just aft of the wing forward bulkhead. If there is insufficient space for this in a particular aircraft, install an angle crank along the root ribs in the wing and put the nose door cylinder in the wing. My first installation was done this way and the operation has been flawless.

(e) After the door has been shaped to the external outline, hollow it as much as you desire (leaving hinge lands) and finish inside and out with epoxy paint. The toughness obtained is worth the effort.

Wing Doors: The wing planview is relatively self-explanatory. Make doors out of two ply balsa—the inner from

hard 1/16" and the outer from soft 1/8". The outer should have grain in the span direction. The doors won't end up 3/16" thick, since the outer layer must be sanded to the airfoil shape; but the gear mechanism must be inset in the wing to allow for the planned door thickness. Don't forget to make the door jamb at the trailing edge of the door, since this supports both the wing fixed sheeting and door (when closed). The Sonic-Tronic cylinder should be built into the wing, inboard of the gear wells, to keep down the roll inertia. The door torque rods must have bearing in two adjacent ribs to provide structural adequacy for long term operation. Adjust the length of the torque rod spur (for the Sonic-Tronic pickup) so that the door is held shut by the cylinder when closed, and also so that the door opens a full 90°. Attach ■ 1/8" plywood stirrup to the door, so that when the torque rod is rotated shut, it will carry the door with it.

The doors have one feature that should be mentioned. They cause a tremendous pitch-up to the airplane when they are open. Normal elevator trim will handle the problem if you want to do it manually. Otherwise, you can make the

simple modification to your transmitter that is shown in the figure. Rather than a gear switch, I use a channel that is controlled by a slider pot for the gear channel. When the slider is in the down position, the limit switch is closed, putting the tunable 1K pot in the elevator circuit. This 1K pot is in series with the appropriate leg of the elevator pot to give down trim change (it takes about 300 ohms on my system to get the proper trim variation). When the slider is moved to the up position, the pot is switched out and the elevator channel is put into (nearly) normal configuration. This discrete pitch change takes care of any tendency the plane would otherwise have to dive or climb. It is done automatically, since the limit switch is inside the transmitter and activated by the gear pot slider.

Note: Do not utilize the double pole feature available in most limit switches. I know that the 1K pot is never completely switched out of the circuit as shown, but if the other pole of the switch is utilized, you will inadvertently interrupt the pulse train in the transmitter circuit and this will "buzz" all channels every time the switch is opened or closed.

ROM-AIR MODIFICATIONS

The heart of the gear door system just explained is shown in Fig. 2. If there is any impasse involved in using the freon operated system, it must certainly be obtaining the switch which is required to modify the Rom-Air system to the required capability. All right, here's the bad news: it will probably cost \$10-\$15 to get the switch block and shuttle made by a machinist. And, here's the good news: once you have the block and shuttle, you can drill all the holes and install the tubing nipples yourself.

Here is how the system operates. The gear channel on your transmitter should be proportional (slider pot) rather than switched. Set up the servo output arm so that it will move the shuttle 1/4" when you move the pot slider half way, and a further 1/4" when you move it the rest of the way. This gives three distinct positions of the shuttle inside the switch block. Now, study the plumbing schematic for the airplane. In one extreme position, both the doors and the gears are up and locked. In the middle position, the doors are held open, but the gear is still up and locked. In the final (extreme) position, the gears are down and locked, and so are the doors. As is seen, two discrete functions are performed by the single servo that normally provides the gear function. What else do you get? Well, no mechanical linkage stretching all over the plane. No battery drain—the freon does the work. Independent operation of the doors and the gears, preventing mechanical operation of the doors and the gears, preventing mechanical failures due to phasing of the motions. Finally, the system is about as light as any electro-mechanical system on the market that uses two gear servos and an extra battery pack.

(Continued on page 102)

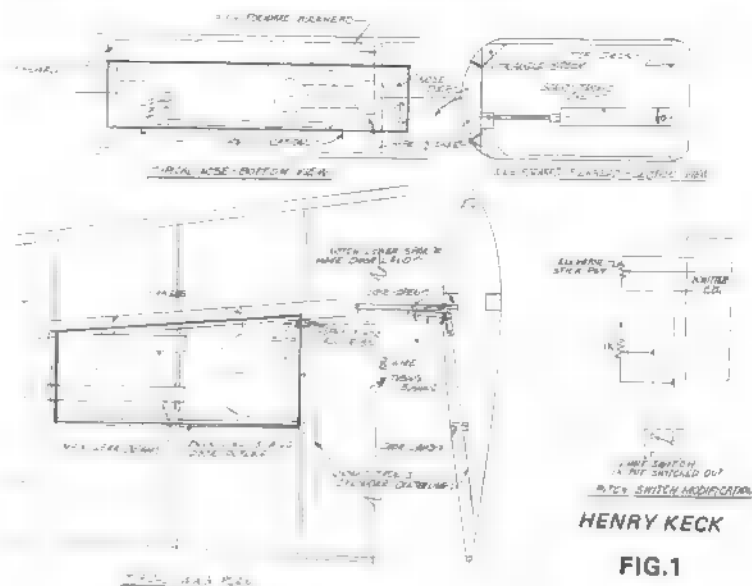


FIG. 1



FIG. 2

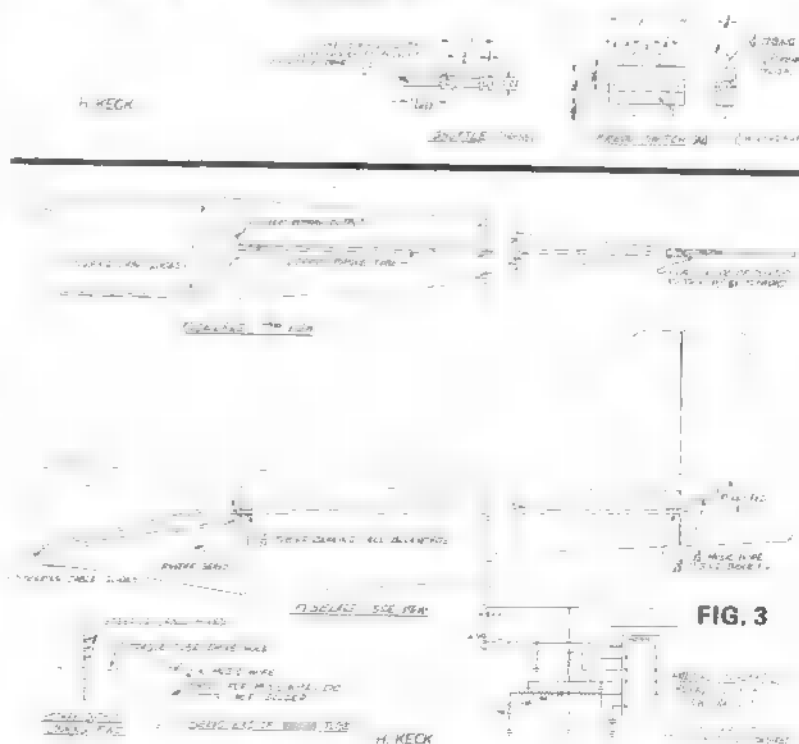


FIG. 3

SAILFISH

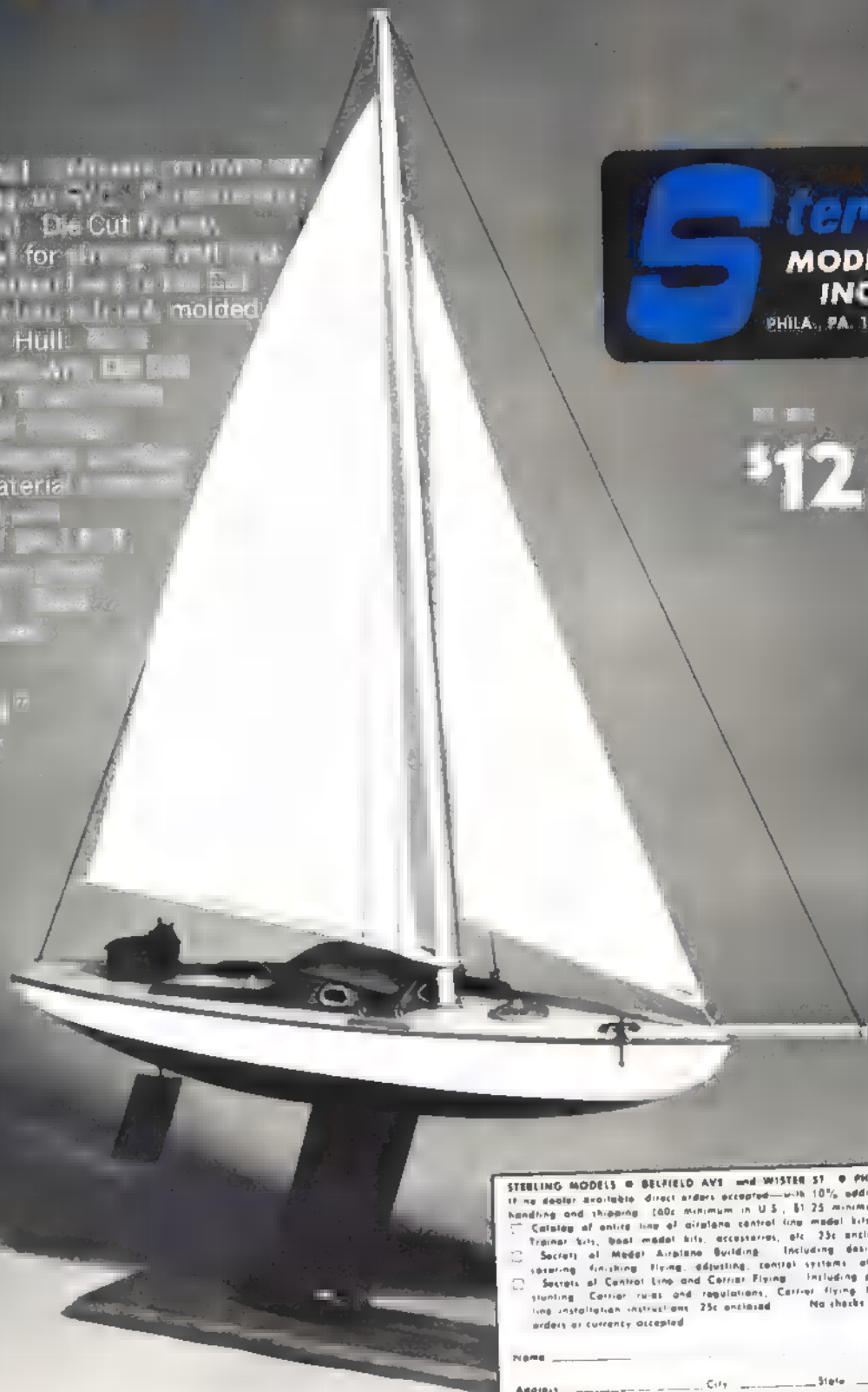
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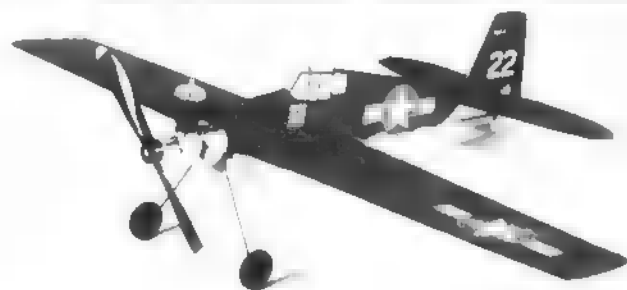
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NMPRA

(Continued from page 32)

also took a second cut—so that *no one* finished the fly-off!

At that point there was great confusion because, in the tremendous excitement of the race, the starting desk had not in fact registered, on the lap counting cards, the fact that Prather had cut in the last two laps—so that by *their* count, Prather had won the race. But everyone among the spectators could see that the striped board and the cut flag for Prather had dropped on the last two laps. Discussions with the flagmen and pylon judge confirmed the view

that Prather had indeed cut twice late in the race. Indeed, they thought Violet had won because, as far as they knew, he only had one cut (his other was on the No. 3 pylon), and they knew for sure that both Smith and Prather had cut at the No. 1 pylon twice.

Chuck Smith was faced with a hard decision: fly it over, almost in the dark (there were some who felt it was really too dangerous to fly it over because of the bare twilight that remained), or let the most important race of the year be decided on the basis of best time. Chuck decided to fly it again. This time, there was so little light left that Prather could not get his engine set right when his tach failed to register. . . he flamed out

on the first lap. The race remained between Violet and Smith. Smith took two cuts, Violet only one, and that decided it. Second and third places had to go on best time, because both Smith and Prather had zeroes in the second fly-off. Thus, the final order of finish was Violet, Prather, Smith, and McCan.

Though almost anything that I write about this race after reporting the fly-off will be anti-climactic, I want to report it as fully ■ possible, for there is a great deal more that is worthy of comment.

One rather unhappy aspect of the race is that an exceptionally large number of beautiful aircraft bit the dust. Just to give you some idea of the extent



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of the carnage: Joaquin Alba came from Mexico City, only to crash in the sixth round, and Marciel Davila followed suit in the ninth. "Speed" Leckie came from Montana to take three zeroes, a third, and then crashed in the fifth round. Jim Jensen's orchid-colored Miss DARA got caught in Whit Stockwell's prop wash around pylon No. 3 in the fourth round and totalled out. Chuck Blanchard, who came with Leckie and Darrol Cady from Montana, wiped out in the second round. Greg Doe came all the way from North Carolina to put on a fine show with two very fast Stegal Minnows, only to wipe out one of them totally in the eighth round and to damage the other on landing, after his

engine cut out unexpectedly on a test flight. Bill Zautner (New York) wiped his plane out in his very last heat.

Terry Prather smashed his No. 1 Minnow into Jack Lee's Miss DARA on landing, after his final regular heat (he flew his backup in the fly-offs). Ron Schorr lost one of his Miss DARAs on takeoff in the second round, but still managed to place a highly creditable 13th in the final standings with his backup. Garry Clay, from Hurst, Texas, lost his ship to a radio failure in the fifth round. Whit Stockwell, after a highly competitive start with three firsts and two seconds, lost his two-day-old Minnow to a radio failure in the last race on Saturday afternoon. Whit nearly

lost his backup Minnow on Sunday morning. It turned out that the problem was in his transmitter, and he had to drop out of the competition. Bud Anders ploughed his week-old Ricky Rat into the dirt beyond pylon No. 3 in his last heat of the contest. Ron Sheldon and Rod Schmidt both crashed with radio problems in their very first heats.

Rick Kuiper came all the way from Wisconsin to see his Miss DARA go in just beyond pylon No. 1 in his second heat (radio interference). Thirteen-year-old Steve Sica, the youngest competitor at the meet, was doing extremely well until the very end, when he lost both of his planes in the last two rounds of the

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contest. Don Downing crashed in his
second heat and had no backup, because
he had loaned it to Ed Rankin, who had
crashed three Formula 1 planes in the
two weeks just before the contest (Rankin
did not, however, crash the borrowed
Miss DARA. There may be a moral in that
sequence of events for Don and Ed to think
about). In all, I counted 21 dead airplanes,
and I'm not sure I recorded all of them. That's
about \$10,000 down the tube.

Of course, you can look at it the other way:
out of 96 airplanes that started, 75 went
home to fly another day. It is certainly not
the case that all the visitors from outside
the Los Angeles area fared badly. Bob
Violett won the whole shebang (including
FAI, which is not exactly unexpected), and
he came all the way from Maryland. Monty
Moncrief, who brought a whole airlift of
competitors from Texas and Kansas, came
in sixth, just two points behind the four who
were tied for first. Jim Maki, the new NMPRA
VP for the Southeast District, and the
organizer of next year's race in Florida, took
seventh place. His teammate Bill Williamson,
tied for ninth in points, with Jack Lee,
Kent Nagy and Cliff Weirick—he ended up
12th in final standings. Adam Sattler took
second in FAI, all the way from Schenectady,
New York. Joe Foster came in third, from the
Bay area.

Since this contest represented the best that
the NMPRA has to offer, you might like to
know the breakdown of

the planes used. There were 31 Miss
DARAs, 20 Minnows, 17 El Bandidos,
eight Ricky Rats, six Ballerinas, six Mid-
wing Cosmic Winds, three Midget Mustangs,
three Ole Tigers, two Miss Dal-lases, and
one Shoestring. As for engines, there was
mighty little to be seen except the 1973
K&B Schnuerle. There were a few fast
Supertigre X-40s, especially Jensen's,
Prather's, and Tusing's, and a couple of HPs.

Our theory, i.e., mine and Whit's, that the
1972 engine produced by K&B (the infamous
100) is better than the 1973 engine, was not
borne out by this contest at all. It seemed
obvious at the time of the NATS, when the
1973 engine had not been out long enough for
the customizers to play around with them.
There is clearly no problem of design
inadequacy in the new engines. One
fascinating bit of information that was
passed on to me, by a reliable source, is that
Bob Violett used the same 1973 K&B engine to
win both Formula 1 and FAI! I hope it's
reliable, anyway: I've pretty much exhausted
my direct sources of engine information, by
virtue of the critical remarks I've made from
time to time. It's a good thing that Whit
and I are genuine amateurs, with no
connection of any kind with any part of the
model industry. You'd be surprised how few
of the leading competitors can make the same
claim: most of them are connected with the
industry in one way or another, and their
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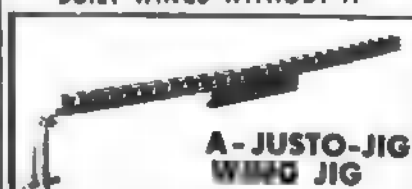
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to be someone around who can shoot his mouth off with financial, if not social or competitive, immunity. I've always admired Maynard Hill for that virtue, even when I've disagreed with him (which, on pylon racing, I usually do).

There were two high points at this race that should not go unmentioned. The banquet, which was the annual NMPRA Awards occasion, was exceptional. Bob Smith was particularly honored as the first pylon competitor ever to win not only his own district championship (Southern California, the most competitive of them all), but also the National NMPRA Season Championship, and the AMA Nationals—all in the same year. Indeed, one wonders what further glory could conceivably be possible for Bob in Formula I. About the only thing he can do now is to try to unseat Bob Violett as the uncontested National and International FAI Champion. But the number of awards made at the banquet staggers the imagination, and also exceeds my retention capacity. In order to take all the hardware home, I think the Northeast contingent (especially Butch Schroeder and Al Sager), must have had to leave their airplanes behind. They picked up the awards for such Northeast Formula II/FAI winners ■ Kent Landefeld and Hal deBolt. Northeast VP, Adam Sattler also had his hands full of awards to take home.

The second high point was the weather: it was ■ pure embarrassment to us Californians. A cold front moved through on Thursday night and dumped an inch of rain, which made a quagmire of the parking area around the flying field the next day. It didn't rain any more, but it stayed cold. Greg Doe had brought Bermuda shorts to wear in our sunny California, and he defiantly wore them on Sunday (underneath two or three layers of wool trousers, sweaters and such). There were several landings that would have been improved by pontoons. At least one engine had to be dug out of a foot of mud and 10 in. of water. I know because I dug it, literally, though I didn't dig it at all, figuratively. One virtue of the weather was that our visitors saw no smog. The flying site, surrounded by snow capped mountains, was clearly visible from 30 or 40 mi. away.

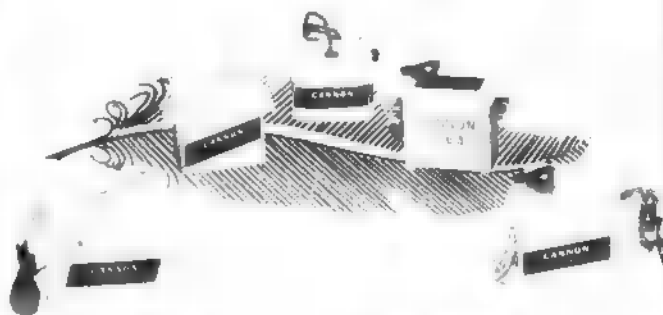
I want to close this report on ■ happy note. There have been many signs of uncertainty in the future of Formula I racing. Membership in the NMPRA is down somewhat from previous years. There has been a lot of flak about professionalism in the sport. Many people feel it is too competitive, or too expensive, for them to get into. But no one, but no one, could have attended this race without feeling that he was participating in a truly memorable, exciting, irreplaceable sport. In spite of the inclement weather and lack of advertising, there was ■ very large and interested body of spectators.

The event was timed to coincide with the publication of the new NMPRA Pylon Racing Book, an activity of the Southern California District,

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initiated by Al Prather and Bror Faber. It is a beautiful, professionally done book, which fully captures the aims and interests of Formula 1 Miniature Pylon Racing. It is a book that the NMPRA can be proud of. The main driving force in bringing it to successful completion was Terry Prather, and he has done something of enormous value for all of us in this sport. I know that it will bring in lots of new blood, new competition and new excitement.

The sport deserves to survive, to grow, to be better known and more widely enjoyed. It is expensive—like golf, skiing, sailing, soaring, or lots of other fine sports. It is frustrating—God, it is frustrating! And because it is frustrating, it can bring humility to anyone who tries it—and rich satisfaction when you get it all together on some rare occasion. It requires a degree of dedication and devotion that few other sports ever demand. It is more like the dedication required for the development of musical talent. And, as nearly always, the deeper the dedication, the greater the satisfaction.

This particular race captured more of the excitement, and saw the products of more dedication and conscientious preparation, than any I have witnessed in seven years of pylon racing.

CESSNA'S PAST MASTERS

(Continued from page 63)

year) was a successful combination of past Cessna Aircraft Company construction techniques, Wichita University classes in aerodynamic theory and "School of Hard Knocks" courses in what makes a winner.

Fabrication of the C-34, and subsequent models, was virtually the same throughout the production life of the series.² The welded steel fuselage was fabric-covered, except for Dural in the area between the cockpit and the firewall, on the landing gear fairings and the wing and fuselage fillets.

Using a NACA 2412 airfoil, the fabric-covered wings consisted of spruce ribs and box spars. The chord of the wing tapered from 84 in. at the root to 56 in. at the tip. Flaps and balance ailerons were mounted directly to the rear spar. The C-34 marked Cessna's first use of wing flaps. Early ones were wood and fabric; later models were metal.

Fabric-covered, cantilevered tail surfaces were of conventional wood construction, while the rudder and elevator were of steel tube. A NACA cowl enclosed a 145 hp Warner Super Scarab engine turning a Hartzell wood propeller.

The first C-34 (c/n 254) rolled off the line on June 1, 1935, and was flight-tested by Cessna pilot George Hart. Flight trials revealed that the high-lift wing and low drag construction gave the four-place airplane a cruise speed of 143 mph, a maximum speed of 164 mph, and, with flaps activated, a comfortable landing speed of 47 mph. Learning that your prototype achieves a better than one mile per hour per horsepower makes for one of your more satis-

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These flights and the usual modifications and improvements that followed, soon earned the C-34 the Civil Aeronautics Authority's No. 573 Approved Type Certificate—that all-precious permit to go into production.

During this time there was precious little money coming in. As with all the airplane manufacturing companies of the period, what cash there was on hand was used to stave off creditors, so they wouldn't cut off vitally needed supplies and utilities. Workers, only hired for the minimum required hours, had to be paid. This usually meant that when paydays rolled around, company officers went home with a pocketful of Hope. Hope in the future, hope that no one in the family got sick, hope that the landlord, the grocer, everyone could hold out—just a little longer.

While trials were still being conducted on the prototype C-34, the second (c/n 255) was sold. With a dandy \$4985 destined for the company's emaciated treasury, Dwane Wallace and George Hart decided to deliver the new airplane personally. Besides, the trip would be a good cross-country test for the C-34. In July, they flew c/n 255 from Wichita to its new owner in Tuxpan, Mexico, and averaged a most respectable 16.9 miles per gallon on the gas. With satisfaction over the results of the trip adding more substance to all the hope everyone had been living on for so long, the thing now was to get the word out.

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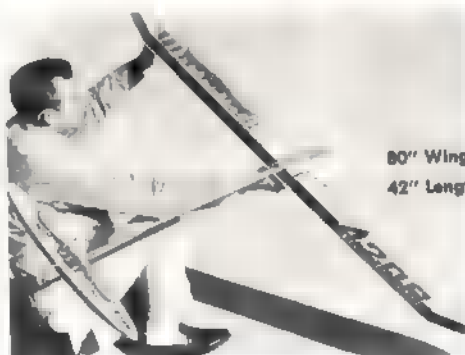
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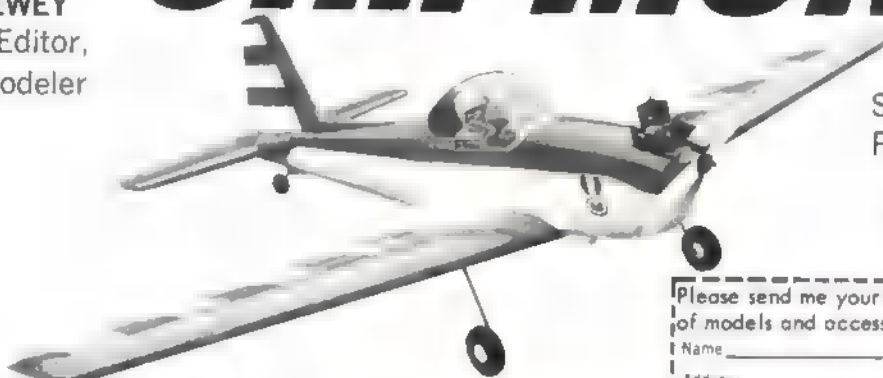
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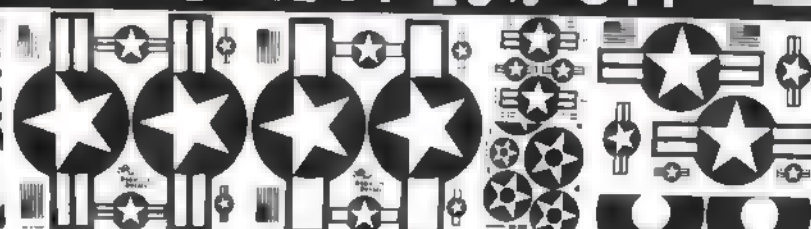
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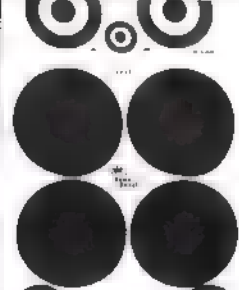
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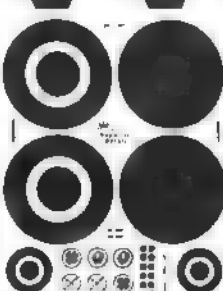
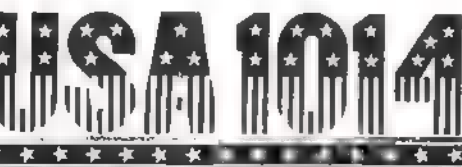
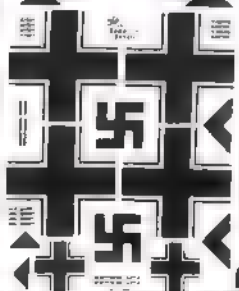
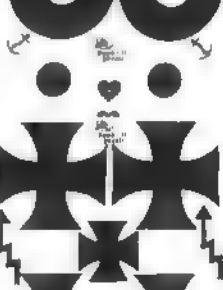
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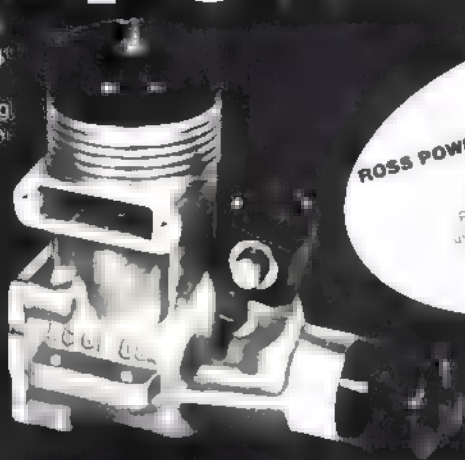


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four-part Detroit News Trophy Race for aircraft efficiency was again an event in the National Air Races, to be held August 30-September 2. Lured by the potential of cash prizes and much-needed publicity, Cessna's No. 4 C-34 went to Cleveland. After copping the Detroit News Air Transport Trophy and winning the 550 cu. in. displacement Sweepstakes, the C-34 returned to Wichita a winner.

Production of the C-34 amounted to only nine that year, but the publicity that resulted from the Cleveland Races brought customers to Cessna. By keeping Cessna aircraft on the racing circuit and before the public, C-34 production rose to 33 in 1936.

On October 8, 1936, Clyde Cessna announced his retirement, and Dwane Wallace succeeded him into the presidency.

Improving and up-dating the C-34 led to the design of the C-37. By Christ-

mas 1937, 47 of these models had rolled out the door. Wallace and Cessna employees could now look back the fallow years of 1931, '32 and '33.

Looking ahead to 1938, further refinement led to the appearance of the C-38 model Cessna, and the first use of the Airmaster name. Based on past performance of the series, they felt the C-38's new, curved landing gear, a larger vertical tail and the addition of hydraulically operated fuselage flaps would solidify with the public. But something about it didn't sell—by September only 15 had left the plant—so, back to the ol' drawing board.

In September 1938, the prototype C-145 (so designated for its 145 hp Warner Super Scarab engine) was completed. By eliminating the shortcomings of the C-38, the C-145 Airmaster incorporated further improvements of hydraulically operated brakes and electrically operated split-type wing flaps.

Here indeed was the master of the air.

During 1938, a gradual improvement in the U.S. economy, wider use of air transport as a means of travel, expansion in air field and airport facilities, the growth of air safety regulations and practices, all encouraged public acceptance of airplanes.

Sticking firmly to conservative policies, the company began to investigate the twin-engine market, while continuing production of the successful C-145 and its sister ship, the C-165 (165 hp Warner Super Scarab). Since both the prototype C-145 and C-165 airplanes are still on the active registry (as of October 1973), it would appear that built-in obsolescence was not a Cessna practice.

From September 10, 1938, until events of December 7, 1941 closed down Airmaster production, a total of 80 of the C-145s and C-165s were produced at the Wichita plant.³ In the

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C-165, a happy marriage of aircraft and engine design produced the envious rating of one mph per each horsepower—not a bad figure after seven years production.

References

1 Except as noted, all data furnished by Cessna Aircraft Company.

2 Paul R. Matt, "The Airmasters from Cessna" *Historical Aviation Album* (Vol. 4, Jan. 1969) pp. 14ff.

3 These figures include three C-165Ds (175 hp Warner Scarab D engine) and one experimental General Motors powered GM Special.

MONSTERS & MONOPLANES

(Continued from page 37)

Monster Construction

☐ Make the aluminum motor mount as described in the first step of the monoplane construction.

☐ Rework the engines, as described in the second step of the monoplane instructions. Make one engine (the outside one) with the cylinder facing left.

☐ Bend the landing gear wires as shown on the plans. Secure them behind the engines.

☐ Glue a 1/8" ply motor backup to the left side of one nacelle, and another backup to the right side of the other nacelle.

☐ Test fit the completed engine/landing gear assemblies to the nacelles, making sure that both engines have a slight offset toward the outside of the circle.

☐ Accurately cut slots in the fuselage for the wing and stab.

☐ Join the elevators with 1/16" music wire. Add the control horn, and hinge the elevators with cloth hinges.

☐ Glue the rudder to the fin, with the appropriate offset. Glue the tailskid in place.

☐ Align the fin and stab assemblies to the fuselage. When it's straight, glue permanently.

☐ Presand the wings with extra-fine paper. Note that the bottom wings have a different outline than the top.

☐ For the deHavilland, install the 1/8" ply control mount on the top surface of the lower wing. For the A.E.G., glue the control mount to the fuselage.

☐ Carefully cut the 20 wing struts from 1/8" dowel. Make sure that they are all the exact length. Using the plan, mark the location of each strut on both wings.

☐ Remove the engine assemblies from the nacelles. Glue four struts to each nacelle at the location shown.

☐ Slide the lower wing into the fuselage and align it with the stab. When it's straight, glue the wing solidly in place.

☐ Glue the four center struts to each side of the fuse and to the bottom wing.

☐ Set the top wing on the center struts, slip the nacelles between the wings, and use rubber bands around both wings to temporarily hold things in place. Adjust everything until the top wing is level with the bottom wing, and

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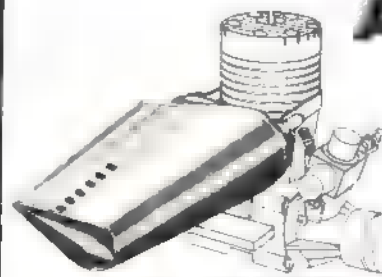
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make sure that the nacelles point straight ahead. When it's all correctly positioned, glue it all carefully.

□ Install the 1/8" balsa wing doublers at the locations shown. Then glue in the final outside pairs of struts.

□ Secure the line-guide to the inside pair of struts.

□ Install the bellcrank and bend a 1/16" music wire pushrod to size. When everything works smoothly, remove all the linkages and paint the model according to the instructions on the plans.

□ Re-install the control linkages, remembering to glue the pushrod guide to the fuselage side.

□ Add the wheels. Note that the A.E.G. has two wheels on each landing gear.

monoplanes give any flying group the feeling of being a complete WWI air fleet. The variety of group combat tactics is endless. Who will be the first to get five "kills" in combat, to become an Ace? How many can get their model to complete a successful mission against a balloon barrage? What happens when there are two or four planes going at the same time—all after one balloon? Let your imagination spark some real fun activities with these sporty planes.

MODEL AIRCRAFT EXPO '74

(Continued from page 9)

While all this was going on in the nice warm confines of the Marriott, several other modelers were out on a large parking lot (just freshly plowed clear of snow), braving 20° temperatures to put on demonstrations of RC and UC flying as well as RC Cars and Model Rocketry. The George Brown family of UC Speed renown, put on the demonstrations of RC Cars and Model Rocketry, while Gene Schaffer, a member of AMA's 1974 World Championship CL Aerobatic Team, flew several excellent Stunt patterns. In the RC flying department, Len Sabato and Joe Romanchick demonstrated the air worthiness of their model helicopters.

In a show which was oriented toward aeromodelling, you might think that the top award would go to a spectacular model plane. But such was not the case as Jim Seaton of Glen Rock, New Jersey, walked off with the "Best in Show" trophy for his excellently detailed model of a Moran Tug Boat. Jim's Tug was radio controlled, and was powered by a homemade steam engine. The steam is generated by a gas-fired boiler. And, get this, fellas, a young woman by the name of Stacey Efron, Clifton, New Jersey, took the "Best Junior Entry" award with a well made Fokker D-7.

Up to this point, I've told you primarily about the show and the various activities that took place, but what about the guys working behind the scenes who pulled all the action together? While many members of the two clubs contributed much toward the success of the affair, there are two guys that should get a special vote of

Flying

When flying the monsters, a handy trick is to warm up the engines first. Always start the outboard engine first. Adjust the needle valve with caution—it's a tight fit between those wings. When it's running properly, shut the engine down by throwing a rag into the prop. Then start the inboard engine, adjust it, and shut it down. Both engines are now warm, and will probably start on the first flip. Top off the tanks. Restart the outboard engine, then the inboard. The twin engines will make a very pleasant sound when properly synchronized.

The monsters are surprisingly aerobatic, and the monoplanes are the hottest thing in the group. Together with the bipes and tripes, monsters and

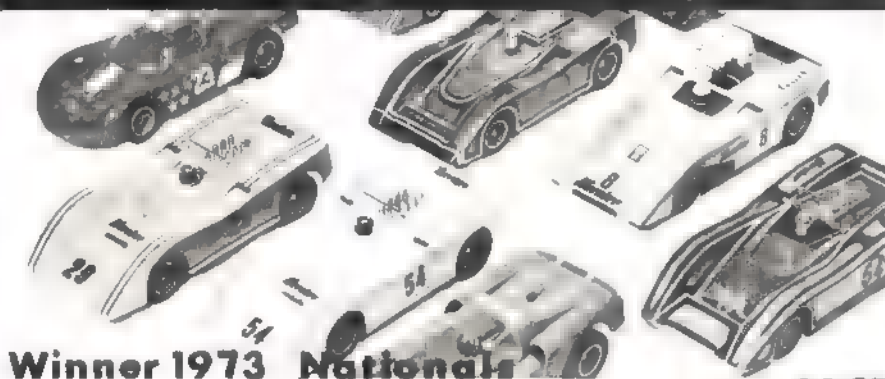
MATERIALS LIST

Quantity	Description	Use
4	1/8 x 4 x 36" balsa	wings, tail
1	3/32 x 3 x 36" balsa	fuselage,
1	1/8 x 6 x 12" plywood	engine backups, bellcrank mounts, line-guides
1	1/8 x 1/8 x 36" balsa	wing stiffeners
1	1/2 x 36" dowel	struts, tailskid
1	1/16 x 1/8 x 36" aluminum	motor mounts
1	1/16 x 36" m. sic	pushrods, landing gear
1	bellcranks	
1	1/2" control horns	
2	1/16" Whiteins WWI wheels	extra pair needed for M.E.G.
1	ply. sheet hinge material	
5	2-56 nuts and bolts	engine mounting

Also: glue, X-acto knife, hacksaw, m. sic.

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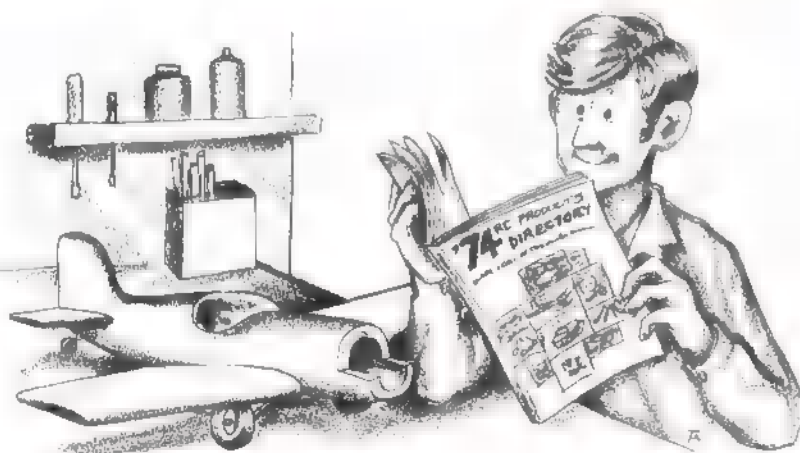


the Cloud Busters of Detroit, Chuck has collected three first place NATS trophies, 39 other trophies, and three National Records in the three years he has been a free flyer. Quite a track record! We do hope, though, that he won't call ALL of his models Maxwell.

Finishes: I goofed in the December 1973 AAM where I gave Steve Fauble's recipe for using Rit dye to color dope. It should read, "Add one package of dye to 1/2 pt. of thinner," not dope. Then add two oz. of the colored thinner to a pint of clear dope. It is best used over tissue of the same basic color rather than over white tissue.

Airfoil Sections. That's the name of the book by John Malkin of New Zealand that contains drawings and plotting coordinates for over 300 airfoil sections, including most of the more popular Free Flight sections. We thought everyone knew about it by now, but apparently not. It also contains a helpful section on airfoil plotting. It is available for \$2 plus 50 cents postage from NFFS Plans and Publications, P.O. Box 322, Dallas, Ore. 97338.

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MB-E1: ELECTROMOTOR AIRPLANE (Continued from page 71)

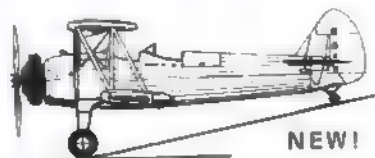


of the plane was increased to 968 lb., i.e., 132 lb. more than the weight of the HB-3.

The performance of the electromotor seems modest at 10 kW (13 hp). However, continuous output is the main concern. Electromotors can be overloaded if run in excess of their rated output. The power is limited only by overheating.

The MB-E1 does not yet have a throttle as such, only an on-off control, which the pilot made use of in the first test flight.

The diameter of the prop measures 59 in. It is the same type prop used with the combustion engine designs. Prop efficiency can be increased by using a prop of greater diameter at a lower rpm or by the use of a blade design which matches the rpm and flight speed exactly.



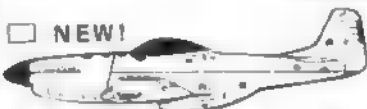
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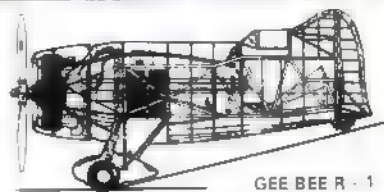


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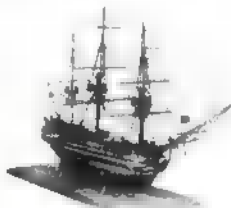
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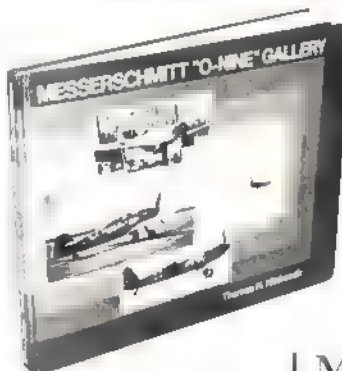
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History of Development

The MB-E1 is basically the result of experimentation with model planes. At least originally, manned electric-powered flight was not considered a goal.

The MB-E1 is the conception of model airplane designer Fred Militky (employed by Graupner). He worked intensively for 18 years (first in 1941) to get electric-powered model airplanes to fly—at first, with little success. After many attempts with different motors and batteries, he could achieve only short flights; the model did, however, maintain a constant altitude.

In 1959, when the highly efficient miniature precision motor became available, Militky succeeded in getting a very tightly-constructed model to achieve climbs which lasted minutes. This model, however, was not practical because it was too light and too wind sensitive. It was significant only as a novelty. Militky developed his design further, and tried to fly larger models with remote control systems as payloads by using more powerful special motors. He first had real success when he began using twin engine models. It became more and more apparent that the greater the size of the model plane, the fewer were the problems. He was finally able, with very large models (eight-ft. wingspan), to achieve flights of 30 min. These large models were equipped with standard radio systems. They can be flown without difficulty, using standard DC small motors.

It may at first seem surprising that better flight efficiency was achieved with the larger electric-driven models. However, this fact is easily explained: as the size of a wing increases, so does the efficiency of the wing (the so-called Reynolds' Effect). This means that with larger wings, the per unit area lifting force is greater than with smaller wings, given flight speed as a constant. A unit area of a large airfoil supplies more lift at a specific airflow than a unit area of a smaller airfoil.

The knowledge of aerodynamics which Militky had gained through his countless model experiments clearly led to the conclusion that—contrary to the prevailing opinion on the subject—a manned, light, electrically driven airplane with relatively good flight char-

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acteristics could more easily be gotten airborne than a small model.

The calculated design parameters were so clear that Militky succeeded in convincing the airplane manufacturer H.W. Brditschka to convert one of his power gliders to electric power. Militky obtained not only a suitable Bosch electric motor, which was constructed for use in automobiles, but also the battery units from Varta.

The static thrust measurements of the converted glider showed that the plane would experience no problems with takeoff (as was later verified in the test flight). The plane was named after the initials of Militky ("M") and Brditschka ("B"). "E" stands for "Electro" and "1" is the construction number; hence MB-E1.

Future Possibilities

Although the first electric flight succeeded without difficulty, and the craft shows definite performance reserves - practically, it could be heavier - the possibilities of electrically powered flight are still limited by the power supply. The batteries which are presently available and which meet cost criteria store too little energy for their weight. The result is a very rapid discharge during flight.

The electromotor itself is practically troublefree. It contains far fewer movable parts than a combustion engine, needs less service, is generally more reliable, is easy to regulate, and starts by itself. Auxiliary units, such as special cooling systems or starters, are not needed. No injurious exhausts are released, and it is noiseless. The propellers (and especially air moving over the prop tips) cause noise, but relative to the combustion engine noise, this is negligible.

All major electric companies in the world are presently struggling with the problem of developing batteries with higher power density, i.e., batteries with greater yields of energy per unit weight. Although such storage batteries are already used for special purposes, they are still prohibitively expensive.

The storage battery of the MB-E1 has a specific power density of about 28 Wh/kg, much lower than that of standard lead batteries, which have over 33 Wh/kg, though they are more sensitive to quick discharge.

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"I brushed four or five coats of color, wet sanded down to the cloth, then applied three more brush coats. After a final sanding I sprayed the last coat with an airbrush. When finished the damage was undetectable, and the total repair added no weight! Let's see somebody try a similar repair using any other product, epoxy or dope. I know it won't be as good because I've tried them.

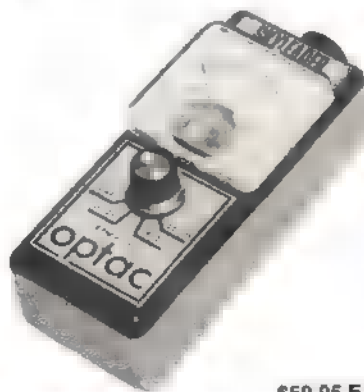
"Later, because of the success of the repair, and some design changes I wanted to make, I rebuilt and completely refinished the model. Again, sandability of Hobbypoxy was the key factor in my decision to rebuild the airplane.

"As far as I'm concerned, until some other product comes along that's superior... and it hasn't yet... I'm going to continue using Hobbypoxy exclusively."

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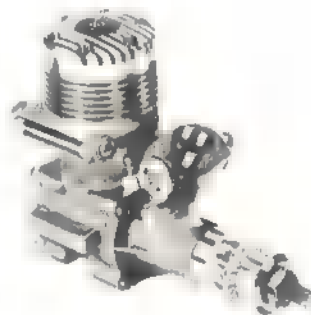


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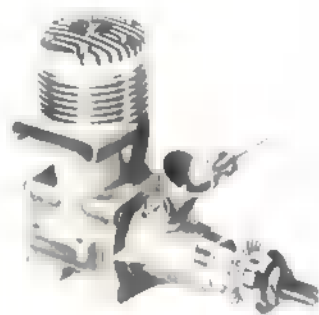
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It can be expected that within the next few years newly developed battery systems will have a power density of 120 to 135 Wh/kg, i.e., five times the capacity by weight of the battery combination in the MB-E1. The flight time would be increased by more than five-fold, because the battery capacity would increase with slower discharge. A storage battery of this nature would allow 40 min. of power and a flight time of more than an hour. (It must be reckoned that, as occurred in the test flight, the motor operational time is exceeded by total flight time.) Such a battery would make an electromotor glider practicable, if the storage battery were lowered in price through mass production. Takeoffs and climbs, glides in favorable thermals, engine power to seek new thermals and a powered return flight to the airport would all become realities. The cost of electricity for charging is practically negligible.

There are already storage batteries with power densities of up to 220 Wh/kg in experimental operation. When batteries of this nature become available, light, aerodynamically clean sport electromotor planes will be an easy matter. A storage battery the size of two briefcases would suffice for flights lasting hours in craft with extremely simple power systems. The craft would be as simple to operate as an electric razor, and as easy to fly as any glider. A charge would take as long as a coffee break.

If and when this all arrives, it will be not because of small aircraft, but rather because of the electric industry and its research engineers. Except for difficulty with the storage battery, the power problem of small electroplanes has been solved.

This, of course, does not mean that better results than have already been realized with the MB-E1 cannot be achieved through aerodynamic improvements, e.g., attainment of minimal air resistance, optimal glide ratio, and optimal adaption of the propeller to the rpm.

However, the fact remains that the first electromotor airplane flight was with a craft which had no especially favorable aerodynamic characteristics and no aerodynamic modifications.

MOONEY ON FF

(Continued from page 61)

place, all-metal airplane called the BD-6. Bill Hannan showed up at the Flightmasters' Jumbo Scale contest with a Peanut Scale version. It sure is a simple little model and should really fly great. Undoubtedly, this will also be available as a plan from Bill.

New Kit: "Where can I find an official three-view of my scale model?" This, frequently asked question is nicely taken care of in the latest Peanut scale kit by Peck-Polymers.

This model of a clipped wing version of the Piper J3 Cub, in addition to giving you all the building materials, gives a very accurate scale three-view. In addition, Peck offers to send a color photo of the actual airplane for \$5.00. The kit includes sticky backed thin mylar decals that will adhere even to an undoped indoor version. They even have a little scale bar, holding the "Cub" sign, for each side of the vertical fin. No liquids are included in the kit, of course, but everything else is there, and is very carefully selected. I can attest that the Cub flies really great.

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I am sure that the balsa is carefully selected, because Bob Peck has on several occasions given me packages of rejected balsa. It was still very good material, but has minute flaws here and there. A good many of the models constructed in my garage Peck Plymers' rejects.

Hard-To-Find Tools Easily Found: The Brookstone Company of Peterborough, New Hampshire 03458, sells hard-to-find tools and other fine things. Any dedicated modeler will not be able to go through the Brookstone catalog without finding something he will just have to have. As an example, they sell a paint stripper with stripping wheels that will give paint stripes of 1/32", 1/16", 3/32" and 1/4", plus spacers, so almost any combination of widths and spaces can be striped. There are literally hundreds of other items, many of which are useful, if not indispensable, to modelers.

FAKIR I

(Continued from page 48)

to aggravate this condition. This concern proved unfounded as the engine has performed beautifully in all weather, and no overheating problems have occurred. One condition that must be avoided is that of overpriming the engine before starting because, in the inverted position, a hydraulic lock can develop and serious damage could result. A wire clip is fastened to the glow plug and extends out the bottom of the fuselage for starting.

The model wheel doors proved to be the most perplexing problem. At first, it was thought that the gear doors would not be any problem because of the clam shell arrangement. Merely let the gear pull the doors closed as it retracts, and that's solved. It seems simple enough, except for one slight problem. The strut is off on one side and, as it contacts the spring, it twists, thus causing the wheel to turn and hang up the doors. This problem was solved by adding a wire to the other side of the wheel, creating equal tension on both sides to keep the wheel straight.

The main gears were built just as designed and worked very well. Minor adjustments to obtain the proper clearances and spring tensions took a good deal of time. The wheel doors do work well, when in adjustment, and the appearance of the model with folding doors is second to none.

The main gears were built just as designed and worked very well. Minor adjustments to obtain the proper clearances and spring tensions took a good deal of time. The wheel doors do work well, when in adjustment, and the appearance of the model with folding doors is second to none.

In retrospect, it appears that the best approach would be to use an auxiliary power system to actuate the doors. The modeler must weigh the effort involved (setting up the door system and keeping them working properly) against the option of simply retracting the gear into open holes. A few years ago, it was totally fixed gear planes; then retractables became the order of the day. Now, perhaps, full working doors will achieve 100 percent reliability and become common place.

CONSTRUCTION

The drawings are more than self-explanatory. Only a few highlights will



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be touched upon. The fuselage crutch is best constructed inverted over the plans. This will result in a true shape and thus avoid a lot of flying problems. The plan is built with a 0-0 incidence setup. The top of the crutch is a convenient reference line to set up the wing and stab on a parallel line. The engine thrust line should be checked before gluing in the firewall. The Tatone mount has a built-in downthrust angle (the newer ones do not) which, in this case, would result in up thrust. This can be corrected by either milling the mount square, or shimming the mount to maintain the zero offset.

The wing, stab and fin cores are covered with 1/16" balsa, using the core blocks as a jig. The wing is covered with a one-piece skin constructed from smaller sheets, as shown on the plans. Epoxy and cellophane tape have proved to be the best combination for joining the sheets (resin gluing makes a more sandable seam). A convenient method of wrapping the leading edge, without the necessity of wetting it, is to use a strip of Coverite. A two-in. strip of Coverite is ironed to the centerline of the wing skin. It has been found impossible to crack the skin, even when bending

around the tightest radius. After covering the cores, the Coverite can be merely pulled off, or left in place to be covered with the finish.

All the wheel doors are constructed by epoxy-laminating two pieces of 1/32" plywood. The hinges are sandwiced in between during assembly. This results in a very warp-free piece of plywood, much better than a single piece of 1/16" plywood.

FINISHING

The model was finished by the K&B "Ultimate Finish" method. All the surfaces are given two coats of resin, followed by sanding with 150 paper after each coat. A coat of primer is then sprayed on and, after curing, is wet sanded with 320. The entire plane is then sprayed with two coats of white Superpoxy. After 24 hours, the plane is wet sanded with 400 paper to a super smooth surface.

Then all the trim is masked off, using black electrical tape (try Scotch Fine Line Masking Tape from the automotive store—Ed.), cut in 3/16" wide strips. The open areas are covered with newspaper and masking tape. Then the trim is sprayed on. After 24 hr., all the

masking tape is removed, and the plane is once again wet sanded with 600 paper *very carefully*. The plane is then sprayed with a couple of coats of clear, one after another, until a super smooth surface results. No polishing or rubbing out is necessary with this method, as the resulting surface is like glass.

FLYING

The foregoing finishing procedure took over two weeks to accomplish, and a bit of apprehension set in as to whether the bird should be flown, or merely hung on the wall as a Toledo-type creation. However, we decided to install the radio and hardware in order to go ahead with the flight testing. As part of the initial design procedure, a projected weight and CG table had been prepared. Now the completed plane was checked against this. The weight was within two oz.; CG was within 1/4" (well within tolerances). The dry weight of the completed plane is seven lb. It could be increased to eight lb. and still be acceptable.

A last minute check of everything was made before going out to the flying field for the first crucial test flight. It was a typical day for a first flight; wind

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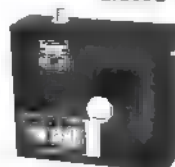
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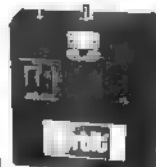
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gusted up to 30 mph, but the sky was bright and sunny. (It's always best to test fly on a windy day, because usually there isn't anyone around to see your mistakes.) After a couple of throttle checks and a little taxiing around, the nose was pointed into the wind, and off into the wild blue yonder. The plane was a delightful surprise to fly. It was very smooth, and the elevator response was just perfect. However, a couple of minutes into the flight, a disheartening sound, familiar to all pylon pilots, was heard: the unmistakable hum associated with aileron flutter. A low altitude pass was initiated and, sure enough, the ailerons could be observed bouncing up and down like a vibrating reed. A hasty landing was executed. Then, back to the old building board.

A quick overnight repair consisted of replacing the 1/8" dia. music wire torque rods with some Rom-Air torque tubes. The ailerons felt solid now, it was back to the flying field. The next day's weather was a duplicate of the first, with the wind velocity perhaps even a little higher. Again a takeoff was commenced, and a series of high speed passes confirmed that the aileron flutter problem had been solved. The trimming

procedure was then begun. The first step was a check of the control response. The elevator and rudder checked out, but the ailerons were a touch fast. A minor adjustment at the horns corrected this. Normally, the plane would be trimmed for straight and level flight as part of this step. This was unnecessary, as the plane literally flew off the drawing board with perfect straight flight. A few flight patterns were performed to show up any deficiencies, but none were found. This plane was capable of flying in a Pattern contest just as built.

The Fakir-I is extremely smooth in the air, probably due to its clean aerodynamics. The elevator response is very soft, making loops, landings and take-offs a joy to perform. The rudder action affects only the yaw direction. Its application at the knife-edge points of the four point roll holds the plane in the correct attitude, and doesn't cause any adverse roll. The wing appears to have a very gradual stall. The model will maintain a nice nose-high landing attitude, without any tendency to drop a wing tip. In the spin entry, the plane will pull up into a stall and then drop straight down into the spin—the way it's sup-

posed to be done. The plane can be throttled down and walked-in for a landing.

ADDITIONS

Two weeks before the NATS, I changed the wheel door mechanisms from the rubber springs to wire coil springs. This system is a vast improvement over anything I had seen to date, and guarantees 100 percent operation and reliability. The system works as follows: with the door open, the spring is geometrically at a right angle to the door and opposes any force tending to close the door. Upon retracting, the wheel hits the spring from the side, pulling the door closed. Everyone who saw this system at the NATS commented on its simplicity and foolproof operation.

Editor's Note: The Fakir-I has done well on the contest trail. The most significant award was a twin victory at Pontiac, Michigan, where the plane won the design contest and took first in C Expert.

See Bruce Lund's Fakir II, the runner-up in the Super Design Contest, on page 48 of this issue. Hints and ideas from other contest entrants appear in this month's Model Techniques section.

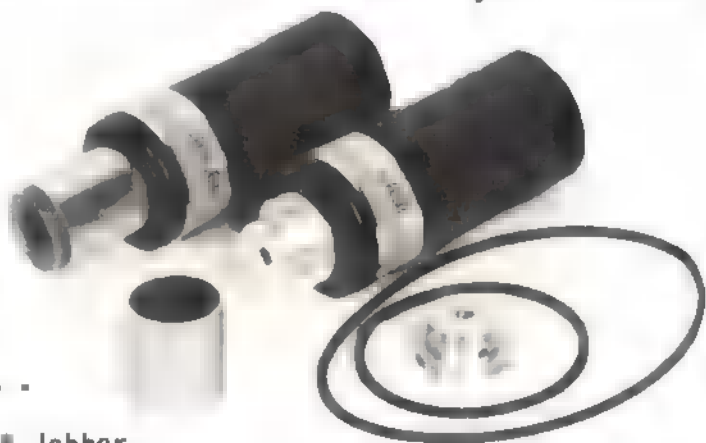
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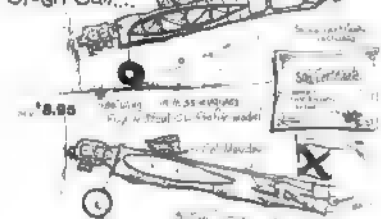
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DON LOWE ON RC

(Continued from page 42)

June, then the contest will take on more of a local flavor. By the way, the Championships will be held June 15-16 at Wright Field, Dayton, Ohio. It will feature Classes A, B, DN and DE, plus Stand-off Scale and Helicopter. DN and DE will fly the new FAI Pattern. You'll come and enjoy the best RC contest site in the country!

Joe Flier—Boy Expert: This meandering series should be completed this session. If we don't get out of flight time or space. You will recall that we have been plowing through the Class C Pattern, making a feeble attempt to help fliers polish their technique. We have four maneuvers to go, so we'll get to it!

Last time, we had completed the 180° Turn an upwind entry heading. Having departed from that heading on a downwind heading, we now turn around and head upwind for the Top Hat.

The Top Hat may be done either upwind or downwind. Try it both ways, and suit your taste. In any event, pull full tilt into this one, since you need lots of energy for a clean vertical leg. Pull up just to the left (or right) of the judges. Into a vertical climb at full bore. Then hesitate, roll 180° again (still climbing), and pull on top. Once straightened out on top, throttle back. Pull down into the second vertical leg, hesitate, do a half roll, hesitate, and pull the bottom (at entry altitude and heading).

Some things to remember: turn all corners with the same radius—don't have a sweeping pull-up on entry, then a soggy flop-over on top. Be sure the vertical is straight before rolling; otherwise your problems are compounded. Don't make this maneuver ten stories high and, in particular, don't place it close that you exceed the 45° elevation limit specified in the rules.

This maneuver is balanced horizontally, with both vertical legs placed an equal distance to the right and left of the judges. If you're going to use the rudder to correct mistakes, be careful, since you'll likely push it

the wrong way, unless thoroughly practiced. If you do it wrong, you're really in trouble, and scoring points will fly out the window.

OK, let's exit this tangle in the classical fashion, and swing around to perform the Three Turn Spin. The spin is always done into the wind, and right in front of the judges. This is really a tough maneuver, and quite often doesn't happen at all, due to the peculiarities of the airplane design. Unfortunately, the aircraft design characteristics that make for smooth, graceful maneuvers work against the spin. A lot of guys have added gimmicks to get additional up elevator to assure a true stall and spin every time.

The spin character of an airplane is built in, and can be only slightly modified by use of excessive control throw or placement of the CG. Of course, you realize that a spiral dive counts for zero; so be sure your bird will spin everytime. For some reason, I've noted that most ships spin easier to the right, but exit slowly. I usually set up to force a left spin, in order to get a smoother, more predictable exit.

Ideally, the craft should spin fairly slow, with the nose down (but not too steep), and the exit should occur immediately upon release of the controls. Unfortunately, most pattern ships require some lead time for the exit, so learn your ship! Should you use aileron? Certainly, if it gives more consistent results, and the spin is well executed.

Let's get into a spin: throttle back, and slowly pull up the nose, while maintaining heading. You may have to apply some rudder as the ship slows, due to the effect of torque and/or crosswind. Pull the nose up distinctly above the horizon, and let the plane stall with full up elevator. Now let it fall straight through the horizon, and then apply rudder (and aileron if necessary). Complete the three turns, the exit appropriately and hope the rotation stops on heading. Now build up flying speed, and pull up level. Exit with 50 ft. of straight and level flight, and call "complete." Simple, no?

One additional note: moving the CG back will make the craft spin easier. Getting it too far back, however, makes the exit harder and

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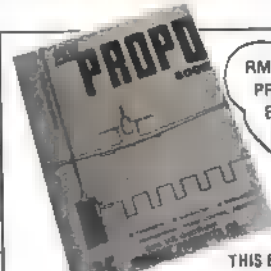
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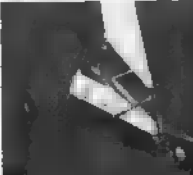
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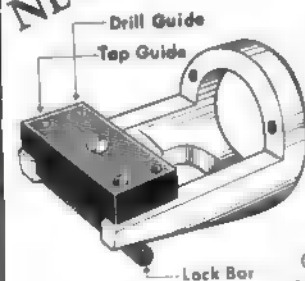
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could encourage a flat spin—disaster. Moving the CG will also influence other things; so, be careful.

The last two maneuvers are the Landing and Spot. Since we covered the Landing earlier (same as the Touch-and-Go), all we must now do is hit the spot, roll out absolutely straight and stop! We'll add just a refresher note: always touch down with the main gear first, contacting the main gear first. Then roll out, and slowly drop the nose. This flaring technique is hard to instruct; you simply must practice.

A good landing ship will allow a lot of nose rotation without ballooning, i.e., a soft pitch response. If your model doesn't have these characteristics, landings will be a lot tougher. You simply want to gradually flare to a nose-high attitude and, when just off the runway, let the plane slowly settle. Some fliers will hold a constant nose-high attitude and adjust rate of descent by using power. Whatever your technique, it all requires practice, practice and more practice! Rots-A-Ruck!

LEW McFARLAND ON CL

(Continued from page 42)

"I have basically solved this problem by using a Tatone DT timer with a pinch off bar, set at a 1/4 Tick-Off. One basic change is the tank size. I have added one oz. more fuel than is normally used. This allows shutoff to occur prior to the typical lean finish. In addition to a more constant run, this also allows you to use the fuel mixture of your choice, rather than one that gives the proper length of run.

"Installation is fairly simple, just mount the timer vertically between tank and engine, and make a hatch big enough to set the desired time. The added weight is usually needed up front."

George has a good idea, and it works. I am sure that he will share more detailed information on this and a similar application to retract, which he is working on. After seeing the 1964 FAI World Championships go off without a single overrun, I would have questioned the need for a timer. But, when you think about Bob Gieske, who might have won the 1972 World Champs, and who would have qualified for the finals at the 1973 Nats... if his engine run had just been a few seconds longer. There could be an application, what do you say Bob?

Interview Series: Gary Akers has suggested that readers interview a group of top stunt fliers via a series of general questions directed at specific "Pros." A comment on this "Pro" bit: you will find these people just like the fellow modelers with whom you are familiar. They differ in that they have set their goals high, and may have applied themselves more, and for a longer time. First, I will need volunteers from the top stunt fliers and they know who they are. Please send in your recommendation for ten fliers whom you would like to have involved. Exclude yours truly, since I am not trying to start a popularity contest. You will hear too much from this horn, regardless. Let's also hear your general questions; then we can get specific when we get the panel.

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Trade Show: Stunt, and control line enthusiasts, in general, ■ not have ■ trade show to rally around. We may never have one, because we ■ not as large a factor in the market ■ we were in the earlier stages of model aviation.

Although the typical RC enthusiast has ■ very stand-off, down-the-nose attitude toward CL, it will long ■ the seed bed for model aviation and youth development. I recently attended the HIAA Trade Show in Chicago (Feb. 3-6), and ■ looks ■ if Cox may have taken ■ good look at Dick Mathis' Pinto. They have made ■ major breakthrough in the Ready-To-Fly market with a truly stuntable ■ 109, 049-powered, fully symmetrical foam wing.

Movies of the model show inverted flight, inside loops, outside loops and Figure 8s. Weight seems to be realistic. Hope to try one out and make ■ full report. ■ It could be a great first airplane. The prototype ■ well received in Chicago.

Top Flite is "stealing" some of my "thunder," in that they are coming out with ■ nice looking stand-off scale P-51, which should be fully stuntable. They are to market it ■ a dual-purpose kit, either RC or CL. The "thunder" comes from the fact that I have demonstrated this versatility with my Akromaster, by flying the same plane with both control modes to complete satisfaction.

Thought I had a first here, but found, to my dismay, that Johnny Clemens beat ■ to the punch ■ FEW years back. Despite all this, my wife, Donna, is sending Johnny a set of red, white, and blue suspenders, to show him he has our support in his AMA programs, as well as to help hold his pants up, after loosing all that weight.

SUDDEN SERVICE PLANS
CHECK PAGE 84

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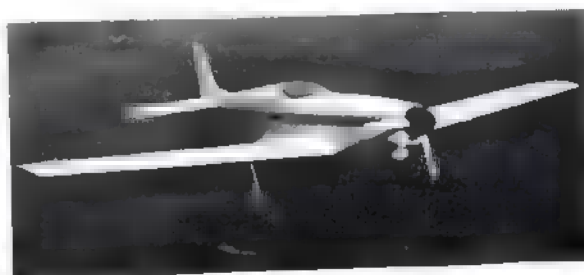
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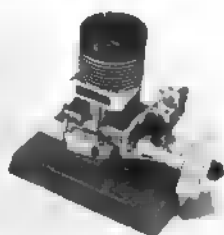
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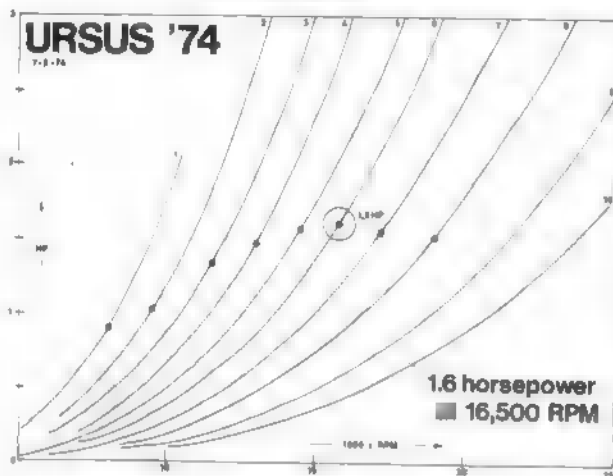


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This chart shows the remarkable horsepower generated by the URSUS '74 .60 engine. The test of horsepower vs. RPM made at the Kavan factory in Nürnberg, Germany using a Kavan Muffler, OPS glow plug and FAI fuel.

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LETTERS

(Continued from page 6)

matter of fact, you stand a good chance of getting stung. At best, it is an expensive, calculated risk. Sometimes, the results are great—as many past Nationals winners will testify. But sometimes the results are worse than what you started with. That is a fact, and most of us know it.

The point is to reduce the shock when you get blown off by a dead stock engine when your super-mill cost three times as much and was reworked by one of the biggest names in the country.

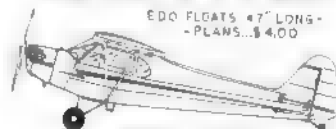
Bill Lovins
Denver, Colo.

Caveat Emptor—Let the buyer beware. Make sure you are an educated buyer when in the hop-up field. Most of the reworked engines aren't totally modified. More often they are just brought to manufacturers' tolerances. Also, if you really need an engine hop-up, you are probably already traveling in the Speed circle, and most of this "in" group knows who does what. If you aren't a Speed flier, that hop-up will be a waste of money because you probably have no idea how to run a super-hot mill. In short, if you don't own at least a \$75 tachometer, then your \$40 engine probably doesn't need a \$50 reworking.

—Editor

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RUDDER BUG

(Continued from page 53)



tor hinge if you're building the rudder only version.

Covering: The wonders of transparent MonoKote on this open framework must be seen to be appreciated. The original, to preserve the vintage image, was done in nylon and dope. Whatever the preference, the bottom of the U.S.A. 27 airfoil should be ironed (doped) by increments from the TE to the LE, working back and forth spanwise.

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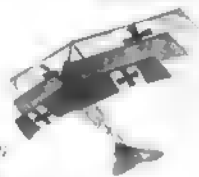
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

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
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order to trot after the errant model) is exceptional, even in moderately turbulent air.


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DR. HENRY KECK

(Continued from page 74)

RUDDER INTERNAL LINKAGE

The main component of this system is the servo. A standard servo just won't turn the rudder crank far enough without making the angle of the crank very excessive. When you make that angle back there very large, then torque builds up and, unless you put three lb. of steel in the torque tube (it is about three ft. long), you'll never get any deflection of the rudder—providing the servo can overcome the drag! Some servo amplifiers are easily modified to any angle of rotation desired, up to 180°. The partial schematic shows where to dicker around with the electrics. If RA and RB are set to about 750 and 680 ohms, respectively, you will approach 180°. I envision about  65° rotation in either direction,



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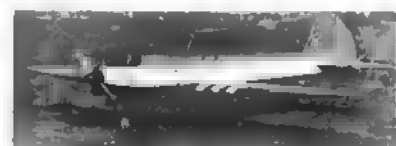
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PAUL HARVEY

(Continued from page 6)

That far south, RC flying is a year-'round activity. It can get gusty in wintertime, but this sharpens pilots, does not discourage them.

I'd never seen such a proliferation of MonoKote.

Back in my home base city, Chicago, we enjoy the long winters and ugly days tediously stretching silk drum tight over balsa ribs. Tediously we lacquer it and sand it and lacquer it and sand it and trim it for show.

Where iron-on covering might sag after steam-heated winter storage, our classic silk-and-dope covering improves with age.

But when you're far enough south for year 'round sunshine there's less fascination for building, more for flying.

Every fortunate community has an "Ed's Hobby Shop." Maybe his name is "Al" or "Jim" or "Jack"—but in Valdosta it's "Ed."

Ed Hewitt, whose building experience goes back to bamboo and who still flies a precision pattern, offers merchandise at the best discount he can, and shares his wealth of experience free.

I saw mostly Kraft radios. This reflects Ed's preference.

If one engine is more popular among the club members—whether in an Aero-master, a Lucky Fly or a Cherokee—it's Veco.

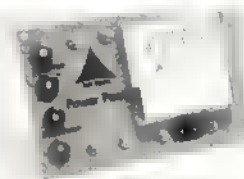
I don't know why. "Preferences come in waves," Ed says.

Around every club there is one vintage flier with a 15 Tigre in a Cassutt—and in Valdosta his name is Pop Curtis.

Pop, from nearby Americus, Georgia, is the club clown. He wears a pith helmet with a propeller on top. The propeller works!

NiCad batteries taped under the helmet spin the prop on top. Pop says it's

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for air conditioning; not intended for takeoff.

There's one seaplane enthusiast in the club. J.C. Johnson (who lives along-side a suburban lake). He is one of two non-builders in the Valdosta Aero Club, unwilling to spend even that much time indoors.

Facilities? Every RC club should have it this good.

The Lowndes County High School, within ten minutes of anyplace in town, has made available its six acre hardtop parking lot alongside I-75 for weekend flying.

Except when a misguided missile rams the stadium floodlights half a mile away, there has been no mishap of consequence. The school's principal, Carlton Adams, says that the presence of the club members on the premises has eliminated weekend vandalism.

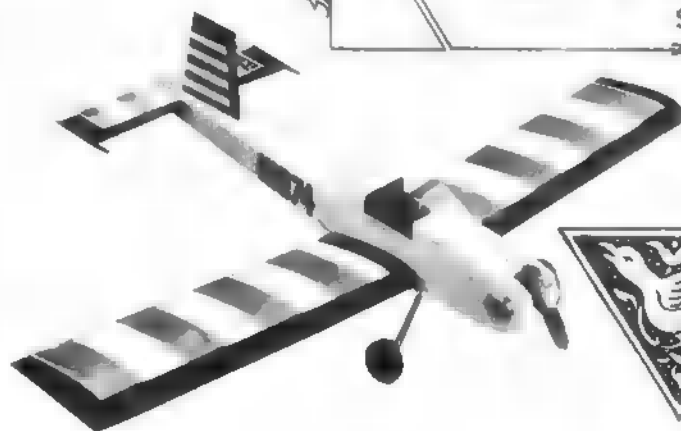
I asked Mr. Adams why this weekend use of school parking lots could not be adopted everywhere. He recommends it.

Using school facilities for such purpose did not require school board action in this instance, but any school boards anywhere are invited to contact him for references.

"The modelers not only behave themselves but assume responsibility for spectator deportment," says Mr. Adams.

Many schools are more hemmed in by residences than is this one, but wherever this is not the case, I recommend researching and imitating this mutually advantageous coexistence.

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Nats Expansion Recommended

If the Executive Council (AMA's board of directors) approves the recommendations of the planning group known as the Nats Executive Committee, some of the events of the 1974 National Contest will begin on Sunday, August 4, and the concluding date will be Thursday, August 15. The Executive Council was slated to meet on March 9 to decide on the Nats and other matters of AMA policy; and the council meeting location was set for Lake Charles, La., the Nats site, providing all the elected representatives with a first-hand look at the huge Chennault AFB.

Chief features of the proposed schedule: 10 days for Radio Control events to allow for adding Quarter Midget Pylon, Soaring and Sport Scale, more time for A & B Pattern, and full Formula I and FAI Pylon heat races (without the previous limitation to top 20 qualifiers); six days for Control Line competition flying with all of last year's events plus Dive Bombing and Strafing, FAI Combat, 1/2A Mouse Racing, Sport Scale, Slow Combat and Formula "40" Speed. Outdoor Free Flight is proposed to remain five days as previously, in accordance with the recommendation of the National Free Flight Society, but Indoor has a proposed expansion to four days (two for high ceiling of approx. 100' and two for low ceiling of approx. 55') with FAI Stick and Peanut Scale being added as Nats events for both high and low ceiling contests and Easy B being added to the low ceiling contest. Depending upon further inputs from the National Free Flight Society, it is likely that some additional FF events will be added to the Nats schedule—Payload and Cargo, for instance.

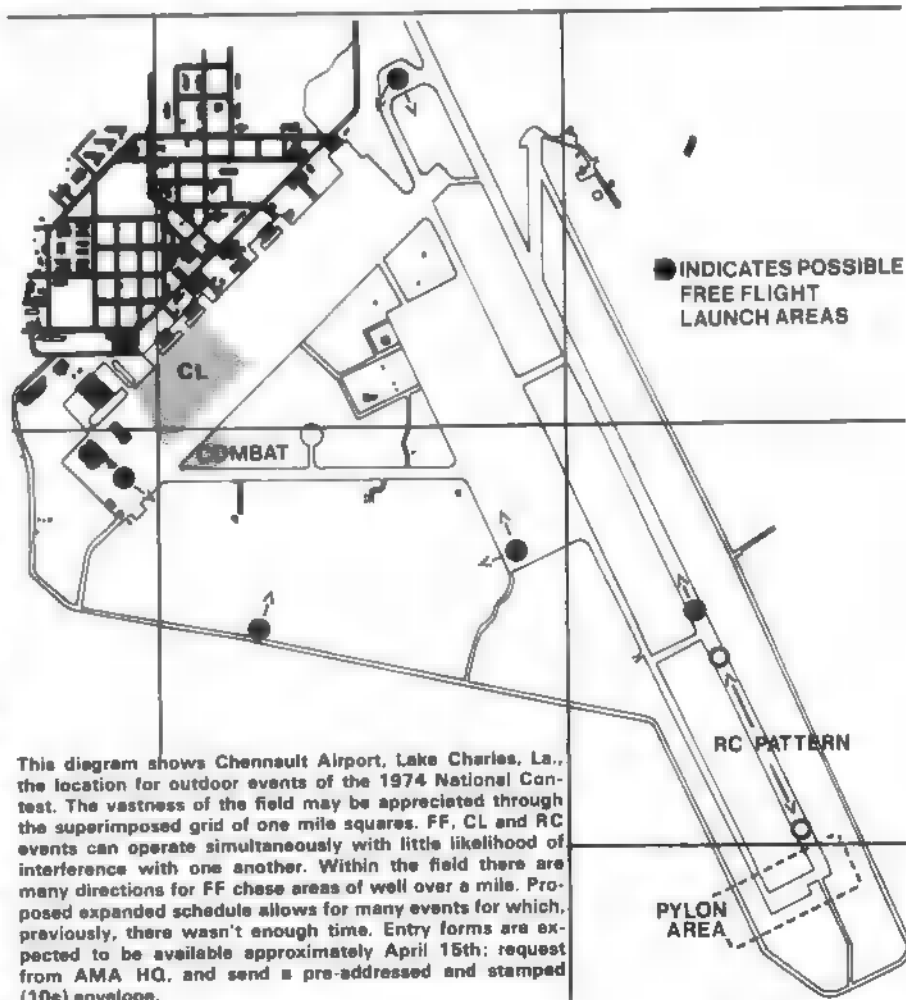
Previous multiple entry restrictions are proposed to be lifted so that, for instance, Navy Carrier I and II flyers may also enter Profile Carrier. And for outdoor Free Flight the plan is to use Category I rules (five-minute maxes) where applicable and assuming weather permits, and to run Wakefield Rubber, A-2 Towline Glider and FAI Power by the round system as

used for World Championships—except for five rounds instead of seven, plus flyoffs as required. A-1 and A-2 Towline events are proposed to be separate instead of combined as previously.

Outstanding Cooperation

The Nats Executive Committee meeting at Lake Charles on January 19 was hosted

in first-class style. AMA President John Clemens, Executive Director John Worth and NEC Member Jan Sakert arrived early the day before and took part in a press conference which officially announced the Nats to the public at large. Evening TV news featured Clemens and Worth as did a front page newspaper photo and page two story. Lake Charles Mayor Jim Sudduth led the press conference which was also at-





One of the state university dormitories in Lake Charles where Nats contestants and officials may stay. They're air-conditioned, \$ per person per night, two to a room. This year the dormitory accommodations will be handled by AMA in conjunction with regular Nats entry.

tended by major community representatives.

The city provided a bus tour of the Nats airfield, the nearby state university dormitory area, the Civic Center (low ceiling indoor site) and the area motels. Members of the Lake Area Radio Kontrol Society helped, particularly in meeting committee members as they arrived at the Lake Charles Airport and in providing other transportation needs. The Holiday Inn was headquarters for the weekend, and the management provided a meeting room which was used until 1:30 a.m. on Sunday for the Nats Planning Conference. Key man in the local hosting arrangements was Larry Bolich, PR director for the City of Lake Charles.

The conference was attended by Clemens and Worth plus Jan Sakert of California, Dick Carson of the State of Washington,

Earl Witt and Ron Morgan from Pennsylvania, Bob Vojslavek from Chicago, and Kemp Bunting from Indiana. Representing the LARKS was their new president, "Nick" Nixon, and former president, John Embry. In the course of the meeting Embry was named to the post of local area Nats coordinator, and another club member, Ned Barnes, accepted the job of manpower coordinator—Ned has already accumulated a list of willing workers from surrounding states.

The meeting was filled with enthusiasm, optimism and "can do" spirit, aided largely by an extremely positive LARKS attitude and the excellent facilities at the site and in the surrounding community. Interesting sidelight: it was noted during the weekend that two of the area motels, the Holiday Inn and the Downtowner, had already registered many Nats contestants.

RC Team Program Still Unsettled

Ordinarily the details of programs to select U.S. teams for World Championships to be held in the following year would be announced by the time of the May "AMA News" or sooner, but new circumstances resulting from actions of AMA officers last summer have resulted in an unforeseen delay. Mainly affected is the program to select the RC Aerobatic Team; only the RC Aerobatics and Free Flight World Championships are scheduled for 1975, and two-thirds of the FF Program is already completed, with only the FF Team Finals remaining to be held in 1974.

At the heart of the delay was the effort to determine AMA officers' intentions following the Executive Council's decision last August in which one man, AMA Technical Director Frank Ehling, was named chief administrator of FAI team selection programs. In attempting to find out whether new programs needed to be structured in accordance with previous guidelines, the end result was an expression by many council members that additional deliberation by the council was needed before proceeding with new programs—and deliberation in person rather than by mail.

The subject of U.S. team program planning was on the agenda for the Executive Council Winter Meeting at Lake Charles, La. (1974 Nats site) on March 9. Hopefully the results of this meeting will allow quick reporting of at least basic information about the RC Aerobatics Team Program. Details will be sent at the earliest possible time directly to entrants in the previous RC Aerobatics Team Program; others who may wish to try for a place on the U.S. RC Team, and who want the earliest information, should send a request to AMA HQ (be sure to include a pre-addressed and stamped envelope).

76.7% Select AAM Option

As of January 31 AMA records show that 76.7% of the adult members chose to receive the *Aircraft Modeler* Magazine as part of their membership package (by paying \$16 dues) vs. 23.3% who chose the "AMA News" reprint (by paying \$12 dues). Continuation of the AMA-AAM contract into 1975 was conditional upon two-thirds of such members choosing the AAM option as of the January 31 date of record. By this formula members have stated their wishes, and it is plain that a large majority want the AMA-AAM arrangement to continue.

Speaking of AMA memberships, it appears likely that a new record will be reached in 1974. AMA memberships in

all categories totaled 37,365 on January 31; this is 3,036 higher than the figure a year ago.

Want to upgrade your AMA publications service? We've heard from a smattering of members who initially chose the "AMA News" reprint who, on second thought, wish to receive the full AAM Magazine. AMA is strictly neutral on the choice the member makes. But if a switch from the "AMA News" reprint to the full magazine is desired, it can be made; it requires an additional payment to AMA HQ of \$4.00 which should be accompanied by the most recent AMA mailing label or a photocopy of it (to be sure that the change is applied to the correct member).

Propose Now or Wait Two Years!

The time is now (and up until June 1, 1974—postmark deadline) to submit competition rules change proposals which, if accepted by Contest Board vote, will be effective in 1976 and 1977. If you miss this time period, the next opening for accepting proposals is January 1-June 1, 1976—for effect in 1978-79. Standard Rules Change Proposal Forms are available from AMA HQ.



Leisure-Time Activity—5th Most Important Thing

PRESIDENT'S MEMO

Do you ever consider the tremendous importance of just which leisure-time activity you choose? I think it would be interesting to perhaps actually give our chosen leisure-time activity or hobby a rating as to its relative importance with other matters of our lives—for instance, its importance relative to how our paycheck is spent. I feel I should rate it in two ways: first, as an absolute essential of life and, second, as a tool or device for keeping us stabilized, happy, and willing to face life's problems.

After sober consideration I would rate one's hobby as **fifth** in importance scaled against essential things on which we spend our paychecks. Because of our constantly increasing social, economic, and political pressures and worries, what we do with our leisure time and the money we spend attending it becomes increasingly important to our lives. As most of us already have learned, a good hobby can easily mean the difference between a happy, well adjusted and contented life, or a miserable one! Miniature plane building, as encouraged by our Academy of Model Aeronautics, might easily prove to be one of the greatest happy essentials of your life.

But only **fifth** in importance? I say yes, at least in how the old paycheck is spent! The way I see it, upon receiving his or her paycheck, a person usually first makes sure the rent is paid. This provides shelter and a "headquarters and storage area" for everything else. Food probably gets the next priority on the list of paycheck expenditures. I am sure there could be some grand arguments as to which is the more important between food and shelter, but in our modern society I think we pay our rent first so as to have a place in which to eat and store our food. **Clothing**, of course, must also be high on the priority list, because even in today's permissive society we must have something covering our bodies when we go for the groceries. The **fourth** essential toward which our paycheck money goes is transportation—because the demands of today's living will not allow us the simplicity of isolation. It's "wheels for meals and other deals."

Now with the four essentials paid for, **rent, food, clothing and transportation**, we can spend what's left on what we darned well please! Your hobby or leisure-time activity will come out of this "what's left" money, and could very well be your **fifth most important expenditure**! In fact, I highly recommend that it receive the next priority.



AMA President John Clemens, center, was very much in evidence at this year's Toledo RC Conference in late February. Although he currently needs to rest every few hours, he spent most of the conference in communications with modelers and industry leaders. Flanking him, left and right, are Conference Co-directors Don Belote and Bob Hisey. Walkie-talkies were used by key officials of the sponsoring Weak Signals Club to constantly monitor all aspects of the show. The 1975 Toledo RC Conference is planned for larger quarters, the Sports Arena in downtown Toledo. Dates: February 22-23, 1975.

Your hobby can be the pacemaker on your life. It can be your stabilizer. It can be your hiding place. It can be your companion. It can be the carrot that dangles in front of you, the rabbit who is always having to hurry to meet today's demands. It can easily be the **one piece of level ground** that lets you endure the mountains of taxes, prices, flat tires, shortages, nasty people, illnesses, the neighbor's dog or cat, the alarm clock, goose-bumps, sweat, nagging relatives, and the myriad of other aggravating problems of life.

It really doesn't matter much what your hobby is (hopefully it is model aviation) as long as it is legal. It simply needs to please you and to fit into that budget of money you didn't spend on those four more essential items. It should, while serving you with pleasure, also expand your knowledge, allow you to exercise your good judgment, and if it is an ideal hobby it will have you practicing manual control and dexterity directed by your mental skills. The "bait" that makes you pursue a hobby is the potential of success that can result from your efforts. Failure is just a challenge to try again and harder! Even if you don't pursue

your hobby as diligently as some of us, it still will afford you pleasant hours in its indulgence. You dip as deep into this well as you choose!

For those who choose miniature aircraft building and flying, there is an **extra bonus** for having made this choice: you occupy your time pleasantly in building your "jewel," you have an end product to be proud of, and the flying of your masterpiece is real "icing on your cake." There you have three possible profits for just the price of one! Where can you get a better bargain?

You may be asking yourself if you are foolish for choosing model aeronautics as your leisure-time companion. You are just one of a vast multitude, because according to figures just declared by one of the hobby industry trade papers, nearly \$1.1 billion were spent on hobbies in 1972, and more in 1973. See, you have joined a tremendous cross-section of the public in spending their **fifth most important money** wisely—and all just for fun!

John E. Clemens
AMA President



Don Shulman

by Jim McNeill

What's it like to be the son of a famous celebrated modeler? Ask Don Shulman. He's the son of Leon Shulman, one of the all time legendary free flighters to come sailing out of the Thirties, and a leader of modeling for almost 40 years.

"For one thing, you start early," confides Don. "My father had me flying before I could walk. He held me in his arms so I would be a little taller and farther off the ground. He was a very experienced flyer and taught me all the basics."

Those basics must have been correct. Don learned his lessons well. At age 2½ he waddled off the field of model combat with a YOUNGEST FLYER award, now 27 he has garnered more than 120 trophies, the end is nowhere in sight. At the recent Bristol, Connecticut, M.U.M. CLASSICS, in addition to his usual hardware won in Combat and Balloon Bust, Don received probably the highest and most cherished honor to date—a plaque for SPORTS-

MAN OF THE YEAR 1973.

Combat Director and Honorary Member of the Berkley Heights, New Jersey, Blade Busters, Don also belongs to the Union, New Jersey, Model Airplane Club. A graduate of the University of Oklahoma, he is today in partnership with his father. Together as Leon Shulman and Associates they represent model, toy, and craft manufacturers in their respective fields.

Is modeling Don's number one hobby? Oh, come on now, take another look at that picture. Do you see anything scrunched firmly in between Don, the SPORTSMAN plaque, and the big plane? Look right in the middle. A girl maybe? See her? That beautiful thing is Don's wife. Married 3 years, SHE is his number one hobby. Model planes are number 2. Betty is a Finnish-Swede, his mechanic and helper at contests, his advisor, and his #1 interest in life. Her lucky number is 13, coincidentally, and little mama wouldn't let Don subscribe to an AMA Life Membership unless they would issue him #13. The



Shulman's were expecting their first Junior modeler in March '74.

Will the third generation baby Shulman take any interest at all in model airplanes? I'll give you 13 to 1 he'll be flying them before he can walk....

Chartered Clubs



This month concludes the listing of AMA Chartered Clubs. The March issue covered clubs alphabetically in the states of Alabama through Montana while those in the April issue covered Nebraska through Oregon. Additional clubs are shown following the state listings; these are newly chartered clubs (up through February 13 processing at AMA HQ) plus a few which were inadvertently omitted from the March and April issues.

Club membership has a lot to offer; contact the person named for the clubs of interest—for meeting time, place and date. The one-letter code at the end of each listing indicates the principal kind of model interest as follows: R—Radio Control, C—Control Line, F—Free Flight, S—Scale, I—Indoor, M—multi-interest.

PENNSYLVANIA

Aircraft Modelers Associates, Joe Lavanga, 3808 Chalfont Dr., Philadelphia 19164	R
Altoona RC Club, George E. Kunstbeck, 1417 E. Hamilton Ln., Altoona 16602	R
Bath Area Modelaires, Clayton G. Ott, 770 Washington Ave., Bethlehem 18017	M
Beaver County M.A.C., Don Jamison, 489 Market St., Beaver 15009	R
Brentwood Flying Aces, Leonard P. Volk, 138 E. Francis Ave., Pittsburgh 15227	M
Bucks County RC Club, Harry Zobel, 3102 Steele Ave., Bristol 19007	R
Buc Le Aero Sportsmen, A. Mashack, Quakertown West Apts., G204, Quakertown 18951	R
Butler Aircraft Modelers Soc., Warren Paffer, 220 State Ave., Elwood City 15044	R
Butler Area R/F Soc., William T. Henderson, 202 Williams St., Butler 16001	R
Central Dauphin M.A.C., Stephen H. Study, 5 Ray St., Middletown 17057	M
College Area M.A.C., A. H. Niessner, Jr., RD #1, Box 398, Boalsburg 16801	M
Delaware County RC Club, Robert Smith, 206 Gleaves St., Springfield 19084	R
Ephrata RC Club, Clyde Weiland, 207 Main St., Akron 17501	R
Erie Model Aircraft Assn., Linley J. Reichel, 3301 Cindy Ln., Erie 16508	M
Erie Model Controliners, Michael J. Dietrich, Jr., 347 E. 21st St., Erie 16503	C
Flying Devils of Pittsburgh, Steve Metrovich, 80 Locust St., McKees Rocks 15138	C
Flying Dutchmen M.A.C., James Kelly, 1789 Herridge Ave., Lancaster 17603	C



Flying Falcons, Robert C. Mohr, Box 221, Fogelsville 18051
 Flying Tigers Club, Joseph J. Hudak, 537 Cooper Dr., Westminster 18974
 Gateway RC Soc., Inc., John R. Blanner, 221 MacFarlane Dr., Penn Hills 15235
 Golden Eagles, Louis F. Cortese, Jr., 2075 Kent, Folsom 95632
 Greater Pittsburgh Aero RC Soc., Karl S. Leach, 82 Estelle Ave., Pittsburgh 15211
 Indiana Co. Model Aviation Club, G. Krempels, 2242 Wilson Ave., Indiana 15701
 Johnson RC Club, George Duray, Jr., RD #5, Box 311, Johnstown 15905
 Keystone Clippers RC MAC, Ronald Woody, 1348 Hilda Ave., East McKeesport 15035
 Keystone RC Club, Edwin Burgess, 438 Franklin St., Lansdale 19446
 Keystone RC Society, Paul Schrape, 3726 North 4th Street, Harrisburg 17110
 Kinzua Aeromodellers, Bill Fehrenbach, 48 Cobham Pk. Rd., Warren 16365
 Lancaster Area Soaring Soc., Paul Ahnert, 442 W. Marion St., Lititz 17543
 Lancaster Co. RC Club, Richard Bowers, 734 Stevens Ave., Lancaster 17602
 Laurel Highlands M.A.C., Eugene Shelkey, 217 Euclid Ave., Scottsdale 15683
 Laurel RC Club, Inc., John S. Ande, 554 E. Main St., Uniontown 15401
 Lebanon Valley RC Club, Inc., Howard J. Rittie, 207 N.R.R. St., Myerstown 17067
 Lehigh Valley RC Soc., James C. Eichner, 2464, Lain, Allentown 18104
 Levittown Aerobugs, Inc., Raymond J. Suder, 610 Hillside Ave., Pennell 19047
 Levittown Flying Bucks, Robert Leishman, 187 Goldenridge Dr., Levittown 19057
 Maple Cave Flying Club, Thomas E. Rea, Jr., 914 Innis St., Dill City 16301
 North Hills Cloud Dusters, E. Eversmann, 783 Thompson Run, Pittsburgh 15237
 Olean M.A.C., George J. Privater, Fortune Dr., Allegany 14706
 Penn Ohio RK Soc., Ted Montgomery, 1639 Katherine St., New Castle 16105
 Philadelphia Sky Pirates, Thomas Kerr, 7824 Lexington Ave., Philadelphia 19152
 Pittsburgh Stunt Masters Club, George Hodder, 823 6th St., Trafford 15085
 Pocono Modelers, Donald C. Hewlings, RD Box 12, Cresco 18328
 Prop Stoppers M.A.C., Michael H. Pelosi, Jr., 44 Pine Tree Dr., Broomall 19008
 Quaker City RC Club, Owen Reeves, 2893 Stamford St., Philadelphia 19152
 Queen City RC Aircraft Club, Earl Schneck, 328 S. 18th, Allentown 18104
 Rangers RC Club, Elliott Charnoff, 10844 Nandina Ln., Philadelphia 19116
 Club of Eric, Inc., Richard C. Thaler, P.O. Box 8132, Erie 16505
 Sawickley Aero Club, Glen E. Kautz, 234 Merville Ln., Sawickley 15143
 Skylarks of Sharon Penn., Joseph H. Bour, 270 Ormond, Sharon 18148
 S.P.A.R.C.S., Jerry Cowan, 1320 Zachary, Roslyn 19001
 State College RC, Richard A. Hanners, 1212, Atherton, State College 16801
 Susquehanna Valley Modelers, Irene F. Knepp, 248 Shembach St., Middleburg 17842
 Susquehanna Valley RC, A. Galetti, 411 E. Southern Ave., Williamsport 17701
 Tri-County Sky Barons, George R. Hubbert, Box 264, Thompsonstown 17094
 Tri Co. Wing Snappers, D. Klein, 765 Lobelia Ave., Liverview Pk., Reading 19605
 Tuscarora RC Club, Robert Greenall, 116 Center St., Tamagwa 18252
 Valley Forge Signal Seekers, Norman A. Evans, 970 Staven Ln., Wayne 19087
 Valley RC Model Club, Inc., Martin E. Kandelin, 504 Second St., Athens 18810
 Westminster Glenside Air Scouts, 2 Tomaras, 222 Cornwall Rd., Chalfont 18914
 Weak End Aero Modelers, Anthony J. Latini, Jr., 214 Rodney Rd., Ridley Pk. 19078
 West Shore Flying Soc., Herbert Zink, 2900 Glenwood Rd., Camp Hill 17011
 Wyoming Valley Ct. Society, Thomas Vacula, Saylor Ave., Plains 18702
 Wyoming Valley RC Flyers, Edward S. Kubast, RD #3, Lincoln St., Dallas 18612
 York Area RC Club, William Stover, R.D. 1, York 17404

RHODE ISLAND

Aquidneck RC Flyers, Gerald Browe, 1 Francisco Dr., Middletown 02840
 CL Aeromodellers of Middletown, George W. Post, 14 Pioneer Ln., Portsmouth 02871
 Rhode Island Aeromodellers, Bernard Collins, 11 Taft St., Cranston 02905

SOUTH CAROLINA

Blue Max Flying Club, Hiram Webster, 1808-B, O'Neal St., Charleston AFB 29404
 Camden M.A.C., William R. Clyburn, 1515 Highland Ave., Camden 29020
 Charleston RC Society, Donna Sormude, 4 Constellation Dr., Charleston 29405
 Coastal Aero Modelers, Barry W. Dolbeer, 809 17th Ave. N., Myrtle Beach 29577
 Gooney Birds, John Owen, 1719 Furman Dr., Florence 29501
 Greenwood Radio Aircraft Mod. Soc., R. Hammond, 123 Portsmouth Rd., Greenwood 29648
 Jackson Flyers Assn., Robert D. Andrews, Downing St., Columbia 29209
 Lexington Aircraft RC Soc., R. Padgett, Jr., 3233 Harrison Rd., Columbia 29204
 Marlboro Aeronautics Club, C. Berry, 108 N. Marlboro St., Bennettsville 29512
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 IV: Carl Maroney, 3107 McComas Ave., Kensington, Md. 20785
 V: Chuck Anderson, Route 4, Box 154, Tullahoma, Tenn. 37388
 VI: Neil Liptak, 325 O'Neal St., Joliet, Illinois 60436
 VII: Earl Pell, 907 Medford Ct., Rochester, Minn. 48063
 VIII: Dale Nutter, 2498 E. 49th, Tulsa, Oklahoma 74106
 IX: Jim Simpson, 2636 Forbes, Omaha, Nebraska 68123
 X: John Donelson, 15182 Little Dr., Huntington Beach, Cal. 92649
 XI: Donald Toepel, 1040 S. 174th St., Seattle, Wash. 98148

COMMUNICATE!

Your officers can't know your thoughts unless you tell them.

CONTEST												
	1	2	3	4								
7	8	9										13
14	15			18	19	20						
				24	25	26	27					
29	30	31										

CALENDAR

Official Sanctioned Contests of the Academy of Model Aeronautics

Note: For quick response and as a favor to those stating, administering and directing the contest, be certain to send a stamped, self-addressed envelope along with your request to the listed Contest Director (CD) for additional information.

April 8-7—Castleton, Ind. Demonstration Flight & Static Display. Site: Marion Co. H. Vandiver CD, 10714 Lakeview Dr., Carmel, Ind. 46032. Sponsor: Hamilton Flying Model Club.

April 7—Sacramento, Calif. (AA) 2nd Northern Calif. FF Council FF Contest. Site: Waagell Field. W. Ghio CD, 328 Redondo Ct., Stockton, Calif. 95207. Sponsor: Stockton Gas Model Assn.

April 7—Dallas, Tex. (A) Dallas RC Club RC Sport Race Meet. Site: Northlake Field. C. Viosca CD, 3450 Salisbury Dr., Dallas, Tex. 75228. Sponsor: Dallas RC Club.

April 7—Winston-Salem, N.C. (A) Novice Stunt & Slow Rat Race CL Contest. Site: W-S Hobby Park. J. Hayes CD, 3948 Talcott Ave., Winston-Salem, N.C. 27108. Sponsor: Golden Triad Model Masters.

April 20—Mulberry, Fla. (A) All Florida RC Soar-In '74. Site: Mulberry, R. Meland CD, P.O. Box 886, Lakeland, Fla. 33803. Sponsor: Imperial RC Club.

April 21—Glastonbury, Conn. (AA) Glastonbury Spring Indoor Flng. Site: Glastonbury High School Gym. G. Armstead, Jr. CD, 89 Harvest Ln., Glastonbury, Conn. 06033. Sponsor: Glastonbury Modelers.

April 21—Phoenix, Ariz. (AA) Spring FF (Cat. I) Contest. Site: Pinnacle Peak Rd. 37th Ave., W. Morris CD, 7422 E. McKinley III, Scottsdale, Ariz. 85257.

April 27-28—Nashville, Tenn. (A) Spring 1/4 Midget RC Rally. Site: Percy Warner Park. W. Sweeney CD, 3924 Plantation Dr., Hermitage, Tenn. 37076. Sponsor: Middle Tennessee Radio Control Society.

April 27-28—Ft. Worth, Tex. (AA) 4th Annual "Lone Star Aerobatic RC Convention." Site: Ft. Worth, L. Stenfield CD, 1617 Lagoons Ln., Ft. Worth, TX 76134.

April 27-28—Dayton Beach, Fla. (AA) Eagle-Beagle Model Airplane CL Contest. Site: Embury-Riddle Campus. H. Lambert CD, 109 Dixie Carriage Rd., Daytona Beach, Fla. 32019.

April 27-28—Raleigh, N.C. (AA) Raleigh/Durham Spring RC Meet. Site: Raleigh, M. Edwards, Jr. CD, 4209 Live Oak Rd., Raleigh, N.C. 27604. Sponsor: Raleigh/Durham RC Club.

April 28—Fayetteville, N.C. (A) Hayes Hobby House Fun Fly. Site: Cross Creek Field. P. Yacubucci CD, 6408 Winthrop Dr., Fayetteville, N.C. 28301.

April 28—Westport, Conn. (A) Conn. Old Timers RC Championships. Site: Sherwood Island. A. Novotnik CD, 4 Beverly Pl., Norwalk, Conn. 06850.

April 28—Cincinnati, Ohio (A) 3rd Annual CL Combat Bash. Site: Lunken Airfield. W. Messery CD, 1122 Eight Mile Rd., Cincinnati, Ohio 45230.

April 28—Warminster, Penna. (AA) Delaware Valley CL Criterium. Site: Warminster. J. Goodman CD, 885 York Rd., Apt. 17C, Warminster, Penna. 18974. Sponsor: Bucks County RC, Inc.

April 28—Sepulveda, Calif. (A) San Valers Monthly FF (Cat. II) April '74 Meet. Site: Sepulveda. B. Hunter CD, 10701 Sharp Ave., Mission Hills, Calif. 91340.

April 28—Fresno, Calif. (A) FGMAC Monthly FF (Cat. I) Meet. Site: Fresno. F. Ginder, Jr. CD, 5740 E. Ashlan, Fresno, Calif. 93727.

May 1—Rockford, Ill. Rock Valley RC Flyers 2nd Annual Indoor Static Display. Site: Rockford. F. Vidmar CD, 4705 Highest Rd., Rockford, Ill. 61107. Sponsor: Rock Valley RC Flyers.

May 3—Sacramento, Calif. (AA) 1st Northern Calif. FF Council FF Contest. Site: Waagell Field. R. Fallon CD, 2667 61st St., Sacramento, Calif. 95817. Sponsor: Capital Condors.

May 4—Cambridge, Mass. (AA) Tech Model Aircrafts Indoor Contest. Site: MIT Dupont Gym. B. Harlan CD, 15 Happy Hollow Rd., Wayland, Mass. 01778.

May 4-5—Zillah, Wash. (A) Valley Aero Modelers RC Fun Fly. Site: Ben's Airstrip. B. Tucker CD, Box 167, Zillah, Wash. 98953. Sponsor: Valley Aeromodelers.

May 4-5—Monroe, N.C. (AA) MR/CC RC Air Races. Site: Monroe RC Club. B. Helms CD, 1000 Tyvola Rd., Charlotte, N.C. 28210. Sponsor: Monroe RC Club.

May 4-5—Huntsville, Ala. (AA) 14th Annual RC Contest. Site: Huntsville. F. Deis, Jr. CD, 7409 Attwood Dr., Huntsville, Ala. 35802. Sponsor: Rocket City Radio Controllers.

May 4-5—Waco, Tex. (AA) The 3rd Texas Open RC Meet. Site: Speegleville Park. M. Blaid CD, Box 544, Hamilton, TX 76731. Sponsor: H.O.T.M.A.C.

May 4-6—Burlington, N.C. (AA) 5th Annual Central Carolina RC Meet. Site: Burlington. H. Earp CD, 2836 Wagner Dr., Burlington, N.C. 27215. Sponsor: B.A.R.K.

May 5—Wyckoff, N.J. (A) N.J.R.C.C. Spring RC Warmup. Site: Wyckoff. J. Beshar CD, 198 Merritt Dr., Oradell, N.J. 07649. Sponsor: N.J.R.C.C.

May 5—Sacramento, Calif. (AA) Northern Calif. FF Council FF Meet. Site: Sacramento. S. Geraghty CD, 2858 Pinecrest Ct., San Jose, Calif. 95121. Sponsor: Oakland Cloud Dusters.

May 5—St. Louis, Mo. Signal Chasers Fly for Fun. Site: Buder Park. M. Hart CD, 938 Donatos Dr., St. Louis, Mo. 63131. Sponsor: Signal Chasers RC Club.

May 5—Frankton, Ind. (A) 8th Annual Madison County Fun Fly. Site: Frankton Club Field. J. Payton CD, 601 W. Washington, Alexandria, Ind. 46001. Sponsor: Madison County RC Flyers.

May 5—Westport, Conn. Country Squires Spring RC Fun Fly. Site: Sherwood Island State Park. K. Bergquist CD, 48 Lakeside Dr., Fairfield, Conn. 06430. Sponsor: Country Squire Modelers, Inc.

May 5—Wichita, Kans. (AAA) 7th Annual Spring FF (Cat. II) & CL Rally. Site: 13rd & Walnut. M. Tallman CD, 3014 Exchange, Wichita, Kans. 67217. Sponsor: Wichihawks.

May 5—Hadley, Mass. (A) Goodyear Pylon & FAI Grand Prix RC Races. Site: Hampshire County RCers Field. J. Papageorge CD, 104 Rocky Hill Rd., Hadley, Mass. 01035. Sponsor: Hampshire County Radio Controllers.

May 11—Marietta, Ga. (A) Cobb County RC 1/4 Midget Rally. Site: Cobb County Prison Farm. B. Jacobson CD, 2205 Britley Terr., College Park, Ga. 30349. Sponsor: Cobb County RC Club.

May 11-12—Oklahoma City, Okla. (AA) TORKS Spring RC Aerobatic Extravaganza. Site: Harter Park. A. S. Coffman CD, 12000 Ecker Dr., Rt. 3, Edmond, Okla. 73034.

May 12—Chicago, Ill. (A) C.P.C. & S.A.C. RC Pylon Race. Site: SAC Field. A. Zinkel CD, 406 Striell Ln., Glenwood, Ill. 60425. Sponsor: Chicago Pylon Club.

May 12—Palos Park, Ill. (A) 1st Annual RC Sport Scale Fly-In. Site: 107th St. & Rt. 45. B. Johnson CD, 1004 61st St., Downers Grove, Ill. 60515. Sponsor: Palos Park Radio Control Club.

May 12—Fresno, Calif. (A) FGMAC Monthly FF (Cat. I) Meet. Site: Fresno. F. Ginder, Jr. CD, 5740 E. Ashlan, Fresno, Calif. 93727.

May 18—Elmira, N.Y. (A) RC Fun Fly Harris Hill. Site: Harris Hill. E. Heyworth CD, 1210 Wolcott Dr., Horsehead, N.Y. 14845. Sponsor: Harris Hill Lift Over Drag.

May 18—Omaha, Neb. (A) M.A.S.S. Monthly RC Soaring Meet. Site: The Grass Pad. J. Simpson CD, 2636 Forbes, Omaha, Neb. 68123.

May 18-19—Bowie, Md. (AAA) Maryland State RC Aerobatic Championships. Site: Bowie Airpark. J. Hausmann CD, 7718 Jaffrey Rd., Oxon Hill, Md. 20022. Sponsor: Prince Georges RC Club.

May 18-19—Wichita, Kans. (AA) Spring RC Pylon Meet. Site: 13th & Webb Rds. H. Smith CD, 1510 Haskell, Wichita, Kans. 67213. Sponsor: Wichita RC Club.

May 18-19—Amarillo, Tex. ARKS Spring Fly-In. Site: Amarillo. J. Franklin CD, 2700 John Dr., Amarillo, Tex. 79110. Sponsor: Amarillo RK Society.

May 18-19—Sumter, S.C. Iris RC Festival. Site: Club Flying Site. James Rampey CD, 1120 Briarland, Sumter, S.C. 29150. Sponsor: Sumter M.A.C.

May 18-19—Tulsa, Okla. (AA) Tulsa Glue Dobbers Spring FF (Cat. II) & CL Rally. Site: 41st & 145th St., E. H. J. Dunham CD, 4730 S. Yorktown, Tulsa, Okla. 74105. Sponsor: Tulsa Glue Dobbers.

May 18-19—Harvey, Ill. (AA) 12th Annual Season RC Opener. Site: Kickapoo Woods. W. Hargreaves CD, 14703 Lincoln, Dolton, Ill. 60419. Sponsor: Radio Control Club of Chicago.

May 18-19—Lafayette, La. (AA) 6th Annual Model Aviation Day RC Meet. Site: Lafayette. B. Fehman CD, 421 Marilyn Dr., Lafayette, La. 70501. Sponsor: Acadian RC Club.

May 18-19—Somers, N.Y. (A) Eastern RC Air Races. Site: Somers. B. Noll CD, 8 Seneca Rd., Danbury, Conn. 06810.

May 19—W. Suffield, Conn. (A) Nor'East RC Air Races. Site: NCRCC Field. D. Laitinen CD, 2 Oakwood St., E. Hartford, Conn. 06108. Sponsor: Northern Conn. RC Club.

May 19—Ft. Worth, Tex. (A) Pylon RC Meet. Site: Ft. Worth. F. Cox CD, 209 Rolling Hills Dr., Alledo, Texas 76008.

May 19—Cleveland, Ohio (B) 2nd Annual Tegel CL Invitational. Site: Cleveland City Field. R. Tegel CD, 425 E. 329th, Kirtland, Ohio 44095. Sponsor: Prop Busters M.A.C.

May 19—Tucson, Ariz. (A) Cholla Choppers MAC Spring CL Slow Fest. Site: Rodeo Park. B. Reynolds CD, Rt. 8, Box 51, Tucson, Ariz. 85710.

May 19—Elmira, N.Y. (A) Spring RC Slope Meet. Site: Harris Hill. E. Heyworth CD, 1210 Wolcott Dr., Horsehead, N.Y. 14845. Sponsor: Harris Hill Lift Over Drag.

May 19—Washington Crossing, N.J. (AA) Bucks Silent Flight FF Meet. Site: Washington Crossing. J. Vansant CD, 337 Parkview Ave., Penned, Penna. 19047. Sponsor: Flying Bucks of Lavittown, Pa.

May 19—Shakopee, Minn. (A) T.C.R.C. RC Glider Contest. Site: TCRC Field. L. Lippert CD, 6292 134th St., W., Apple Valley, Minn. 55124. Sponsor: Twin City Radio Controllers.

May 19—Mowasque, Ill. (B) Blunderbirds RC Soaring Contest. Site: Kroenleins Airport. D. Holtfater CD, P.O. Box 366, Blue Mound, Ill. 62513. Sponsor: Decatur Blunderbirds.

May 19—Chagrin Falls, Ohio (AA) 10th Annual Erie Model Aircraft Assn. Old Timer FF (Cat. II) Meet. Site: Savage Road. V. Didelot CD, 4410 Loma Ln., Erie, Penna. 16506. Sponsor: Erie Model Aircraft Assn.

May 19—Aurora, Colo. (AA) C.A.T.S. Spring CL Bash. Site: 2nd & Peoria St. J. Vido CD, 4676 Dudley St., Wheatridge, Colo. 80033. Sponsor: Colorado Air Tragedy Society.

May 19—Dallas, Tex. (A) Dallas RC Formula I RC Meet. Site: Samuels Park East. S. Fly CD, 3617 Oakbriar Ln., Bedford, Tex. 76021. Sponsor: Dallas RC Club.

May 25-26—Spokane, Wash. (AA) 4th Annual Memorial Day RC Glider Meet. Site: Shaw High School. R. Holzapple CD, 1025 N. Stevens, Spokane, Wash. 99208. Sponsor: Barons Model Club.

May 25-26—Kansas City, Mo. (AAA) Royal Midwestern CL Championships. Site: Swope Park. B. Wright CD, 2818 Collin, Independence, Mo. 64062.

May 25-26—N. Little Rock, Ark. (AA) M.A.R.C.S. 3rd Annual Pattern & Standoff Scale RC Meet. Site: M.A.R.C.S. Bishop Field. J. Medley CD, 324 Belmont Dr., N. Little Rock, Ark. 72118. Sponsor: Mid-Arkansas RC Society, Inc.

May 25-26—Council Bluffs, Ia. 2nd Annual National Falcon Tournament. Site: Council Bluffs. M. Wilken CD, 136 Zenith Dr., Council Bluffs, Ia. 51501. Sponsor: Cobras RC Club.

May 25-26—Clovis, N.M. (AA) MADS Annual RC Contest. Site: MADS Field. E. Harvey CD, Star Route, Box 48, Clovis, N.M. 88101. Sponsor: Clovis M.A. Driver Soc.

May 25-26—Tullahoma, Tenn. (A) Coffee Air Foilers Thermal Soaring RC Meet. Site: Model Field. C. Tutthill CD, 101 Westwood Dr., Tullahoma, Tenn. 37388. Sponsor: Coffee Air Foilers.

May 25-26—Ft. Sill, Okla. (A) Laff's 2nd Annual RC Sailplane Classic. Site: Laff's Field Gate 4. J. Apoka CD, 6532 McGlachlin Ave., Ft. Sill, Okla. 73503. Sponsor: Lewton Area Fun Flyers.

May 25-26—Benton Harbor, Mich. (AA) Third Annual Whirlwinds RC Pattern Meet. Site: Benton Harbor. M. Klintworth CD, 1449 Main St., St. Joseph, Mich. 49085. Sponsor: Whirlwinds of SW Michigan.

May 25-27—Dahlgren, Va. (AAA) Virginia State RC Championships. Site: Dahlgren Naval Weapons Lab. P. Veatch CD, 3510 Country Hill Dr., Fairfax, Va. 22030. Sponsor: Northern Va. RC, Inc.

May 26—Glastonbury, Conn. (A) Old Timers Spring Rally. Site: Glastonbury Meadow. G. Armstead, 89 Harvest Ln., Glastonbury, Conn. 06033. Sponsor: Soc. of Antique Modelers Chapter-7.

May 26—Downers Grove, Ill. (AAA) Memorial CL Classic. Site: Downers Grove. B. Vojalevek CD, 7819 Chestnut Ave., Downers Grove, Ill. Sponsor: Woodland Aeromodelers.

May 26—Portland, Ind. (AA) SWOFF Spring FF (Cat. II) Fly-In. Site: Portland. W. Kozak CD, 3052 Village Dr., Ft. Mitchell, Ky. 41017. Sponsor: South Western Ohio FF.

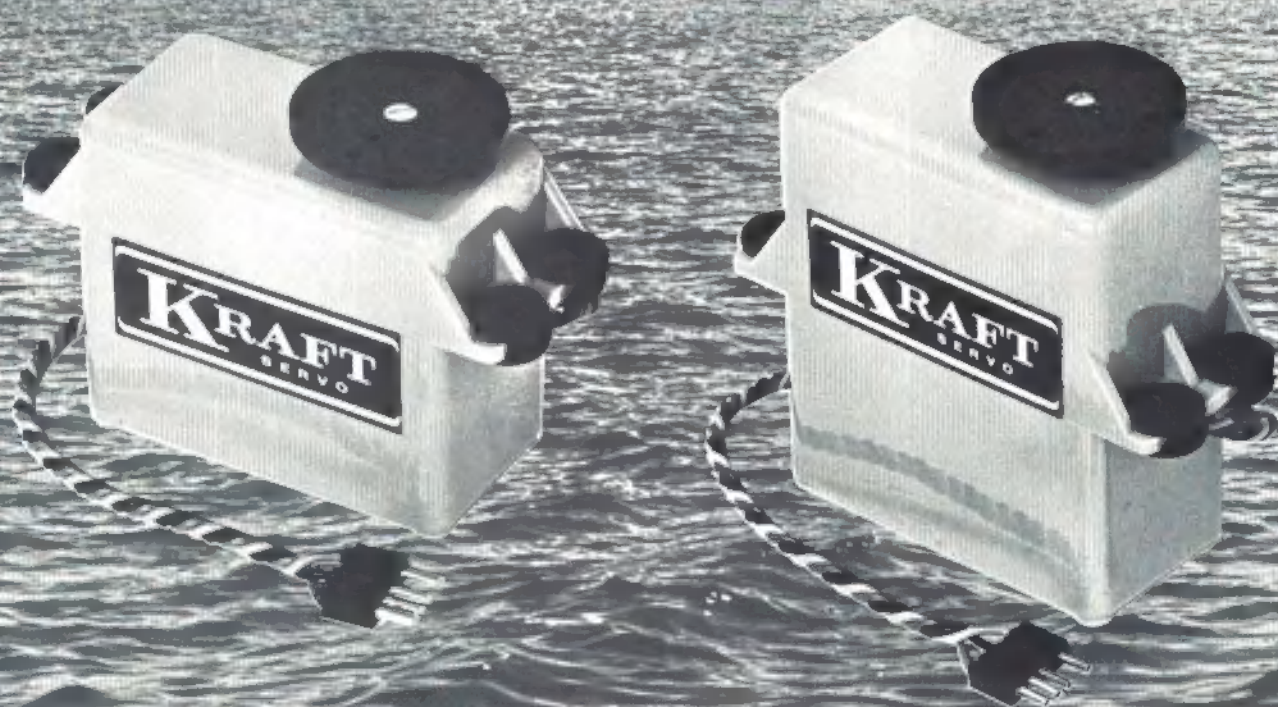
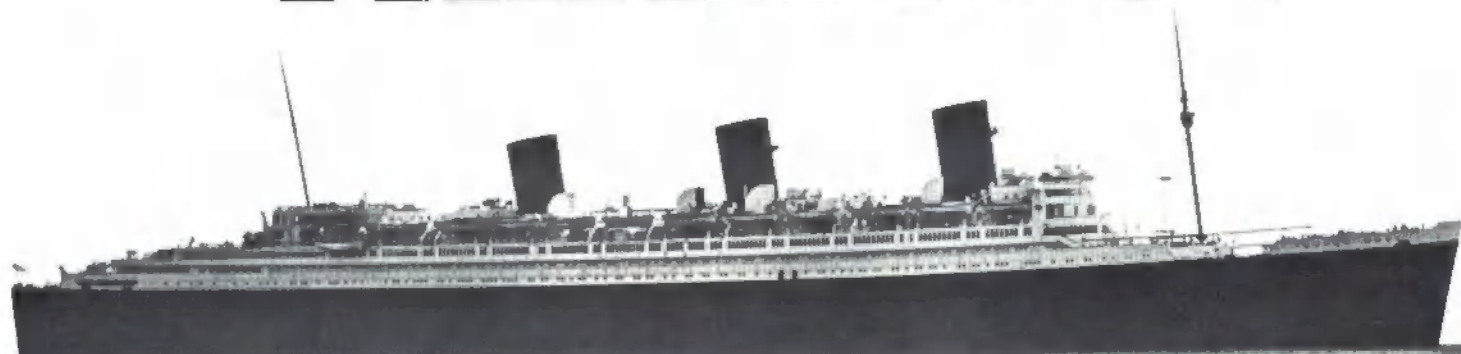
May 26—Bridgewater, Mass. (A) Spring '74 FF Meet. Site: Correctional Institution. S. Colson CD, 47 Sammet St., Everett, Mass. Sponsor: New England Wakefield Group.

May 26—Chardon, Ohio (AA) CRC 12th Annual RC Pattern Event. Site: Chardon. F. Sheplav CD, 38981 S. Lakeshore Blvd., Eastlake, Ohio 44094.

Chartered club officers who receive the AMA Monthly Mailing found out in March what was March's big modeling news. Did you? If not, ask your officers why not!

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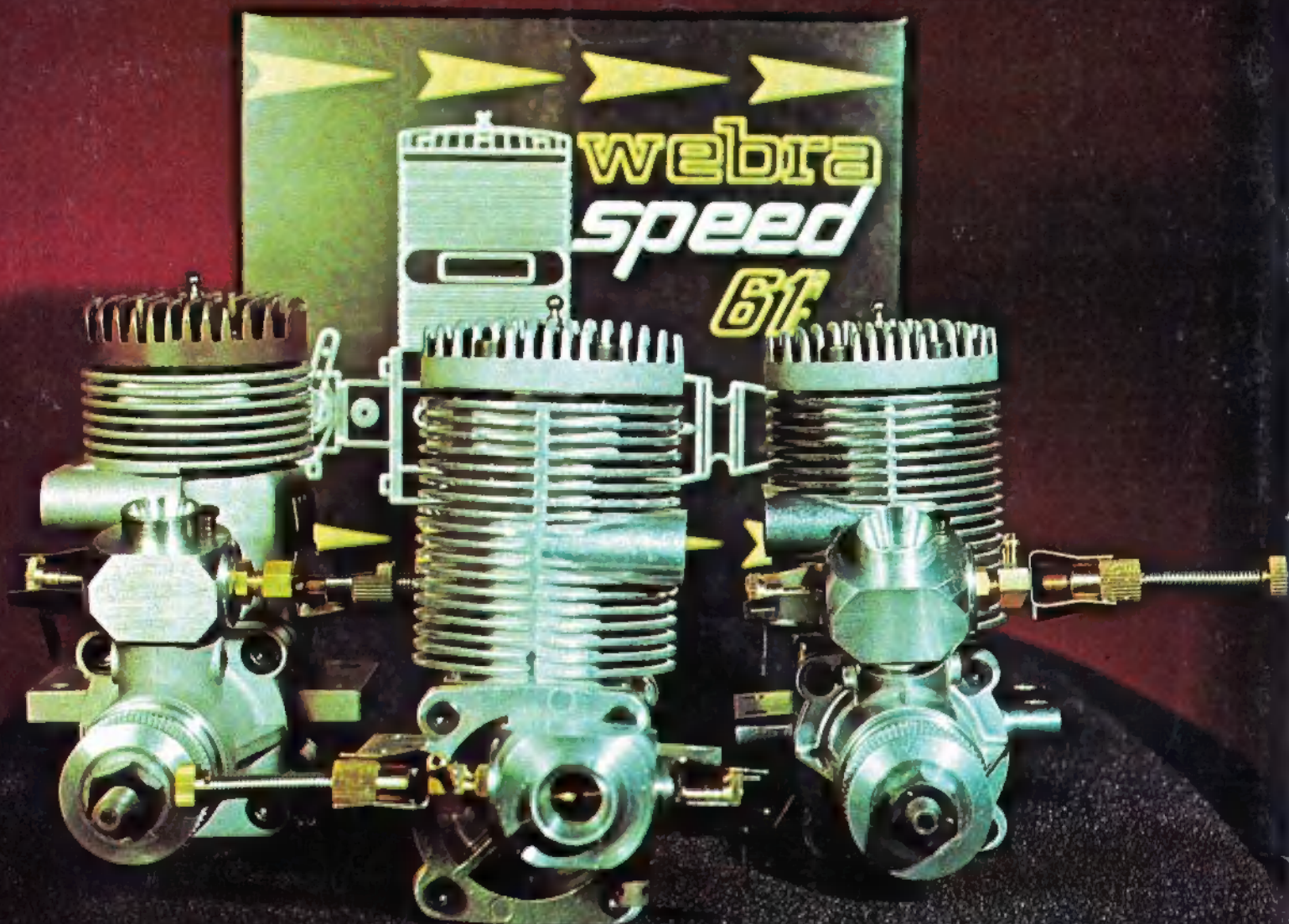
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